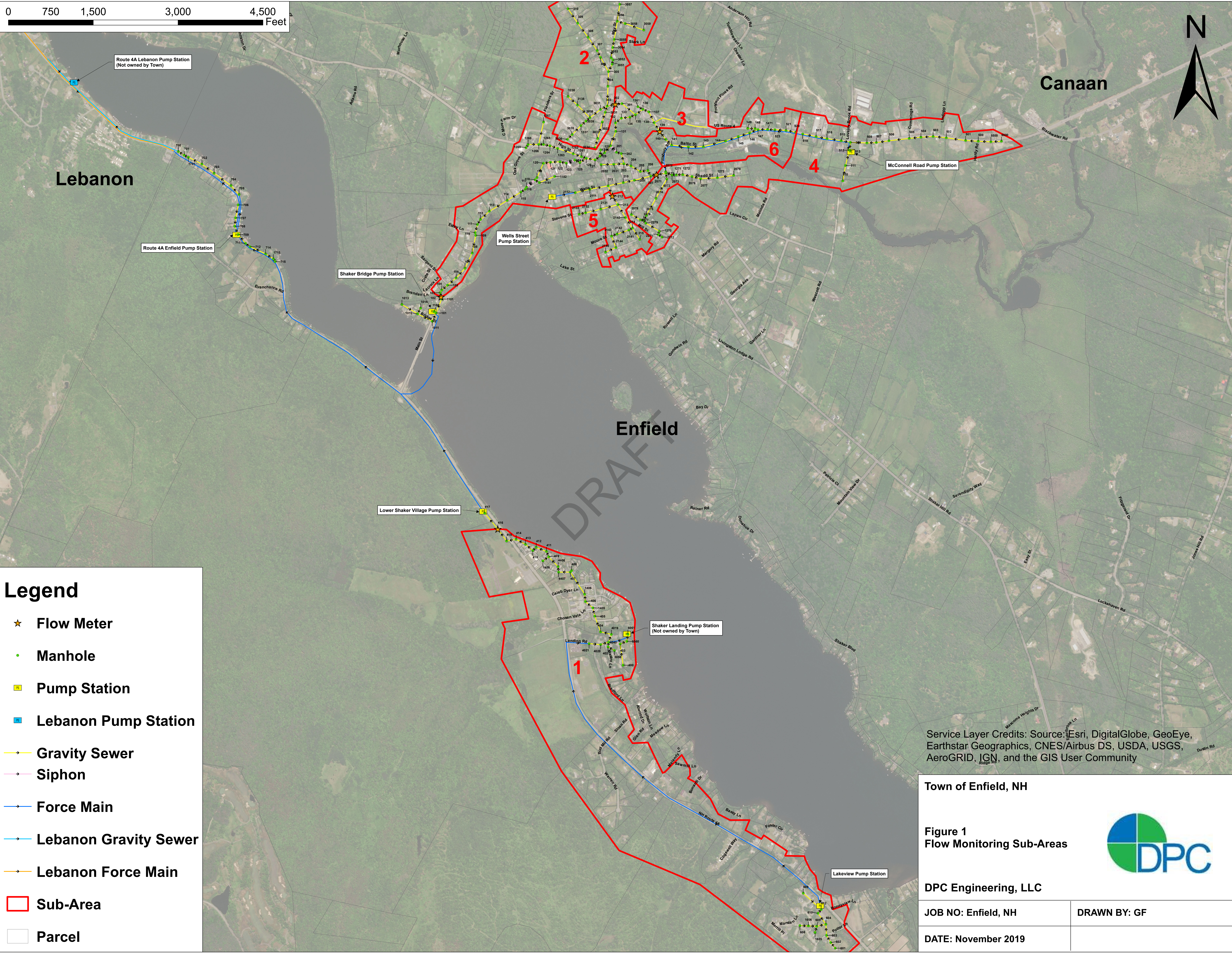
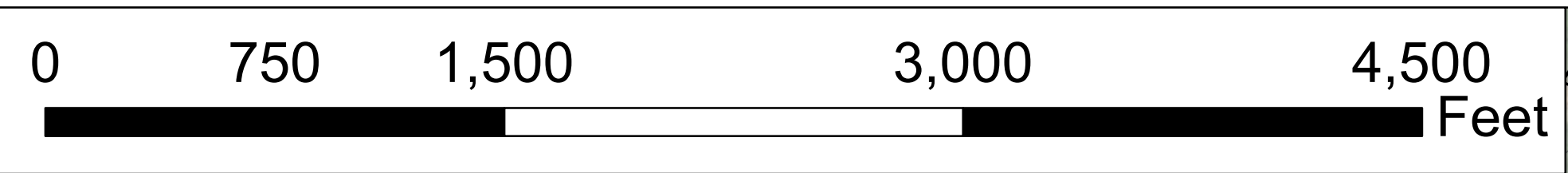


Appendix A

Flow Monitoring Summary

DRAFT



Legend

- ★ Flow Meter
- Manhole
- Pump Station
- Lebanon Pump Station
- Gravity Sewer
- Siphon
- Force Main
- Lebanon Gravity Sewer
- Lebanon Force Main
- Sub-Area
- Parcel

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Town of Enfield, NH

Figure 1
Flow Monitoring Sub-Areas



DPC Engineering, LLC

JOB NO: Enfield, NH

DRAWN BY: GF

DATE: November 2019

Figure 2 Flow Monitoring Stick Diagram

Enfield, NH

Prepared on November 11, 2019



LEGEND

-  Open-channel Flow Meter
-  City of Lebanon
-  Path of Flow Through Collection System

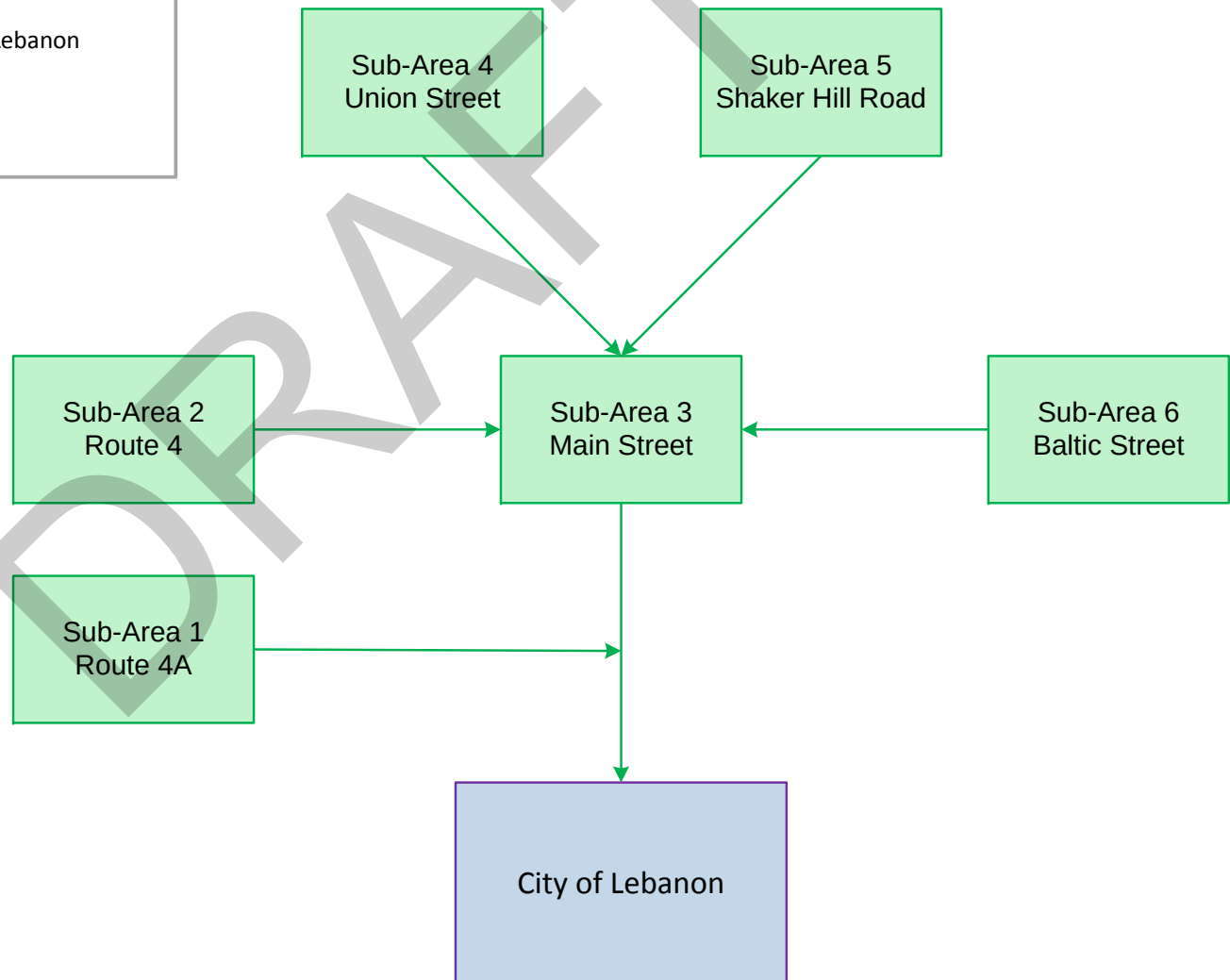


Figure 3A: Flow Meter #1 - Route 4A (Enfield, NH)
Flow Rate vs Groundwater



Figure 3B: Flow Meter #1 - Route 4A (Enfield, NH)

Flow Rate vs Rainfall

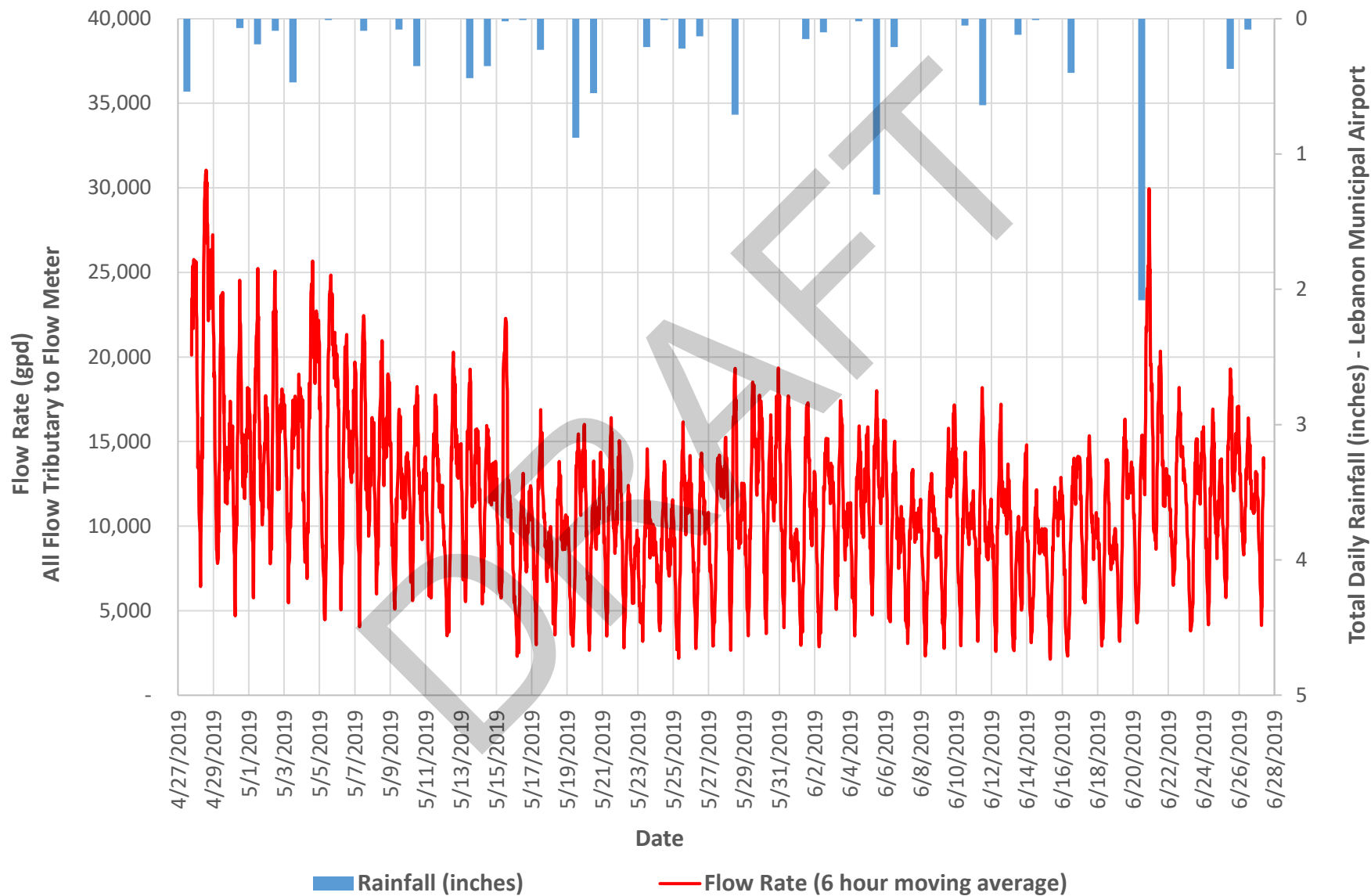


Figure 3C: Flow Meter #1 - Route 4A (Enfield, NH)
Flow Rate vs Groundwater

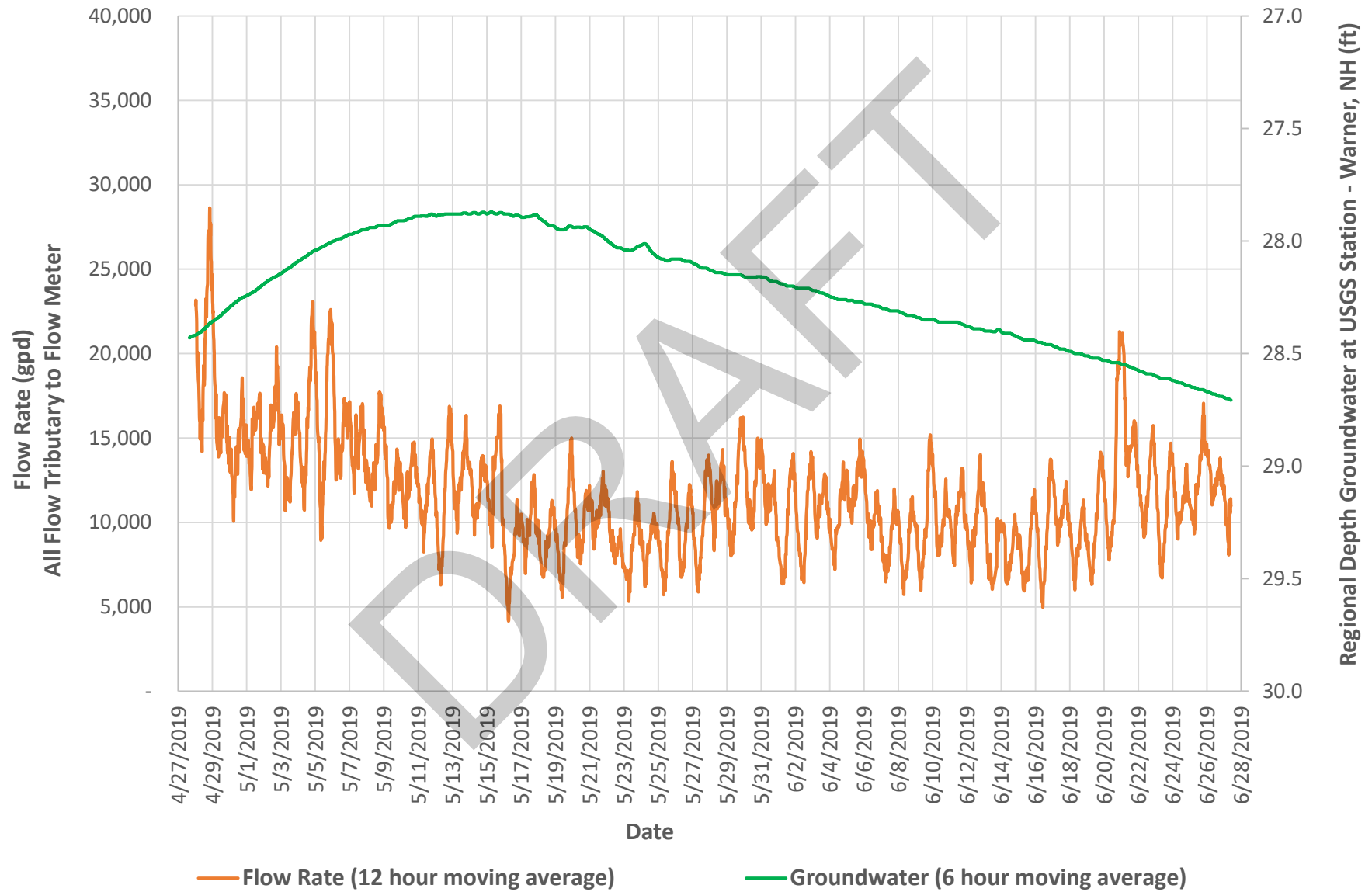


Figure 3D: Flow Meter #1 - Route 4A (Enfield, NH)

Flow Rate vs Rainfall

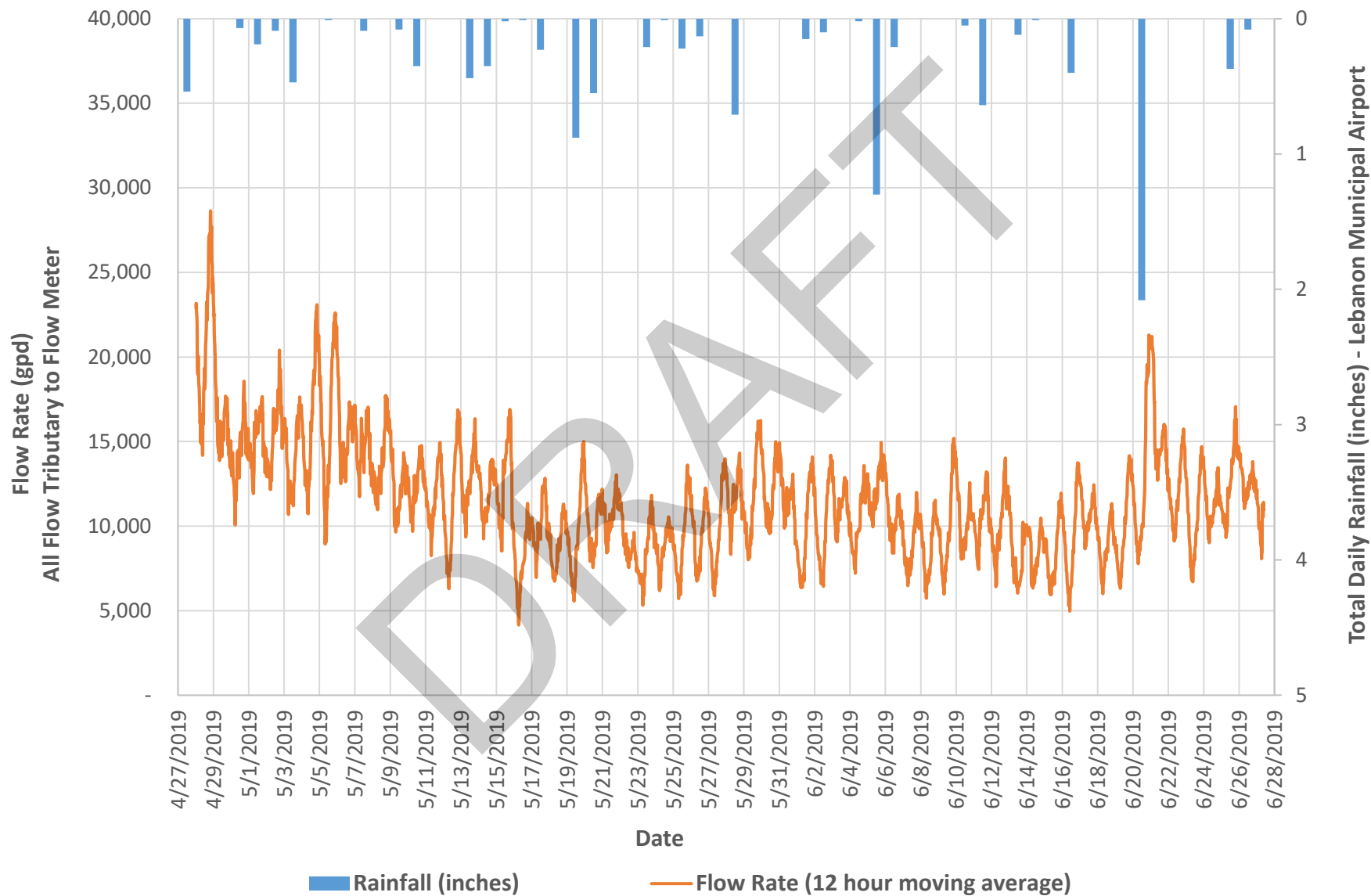


Figure 3E: Flow Meter #1 - Route 4A (Enfield, NH)
Flow Rate vs Groundwater

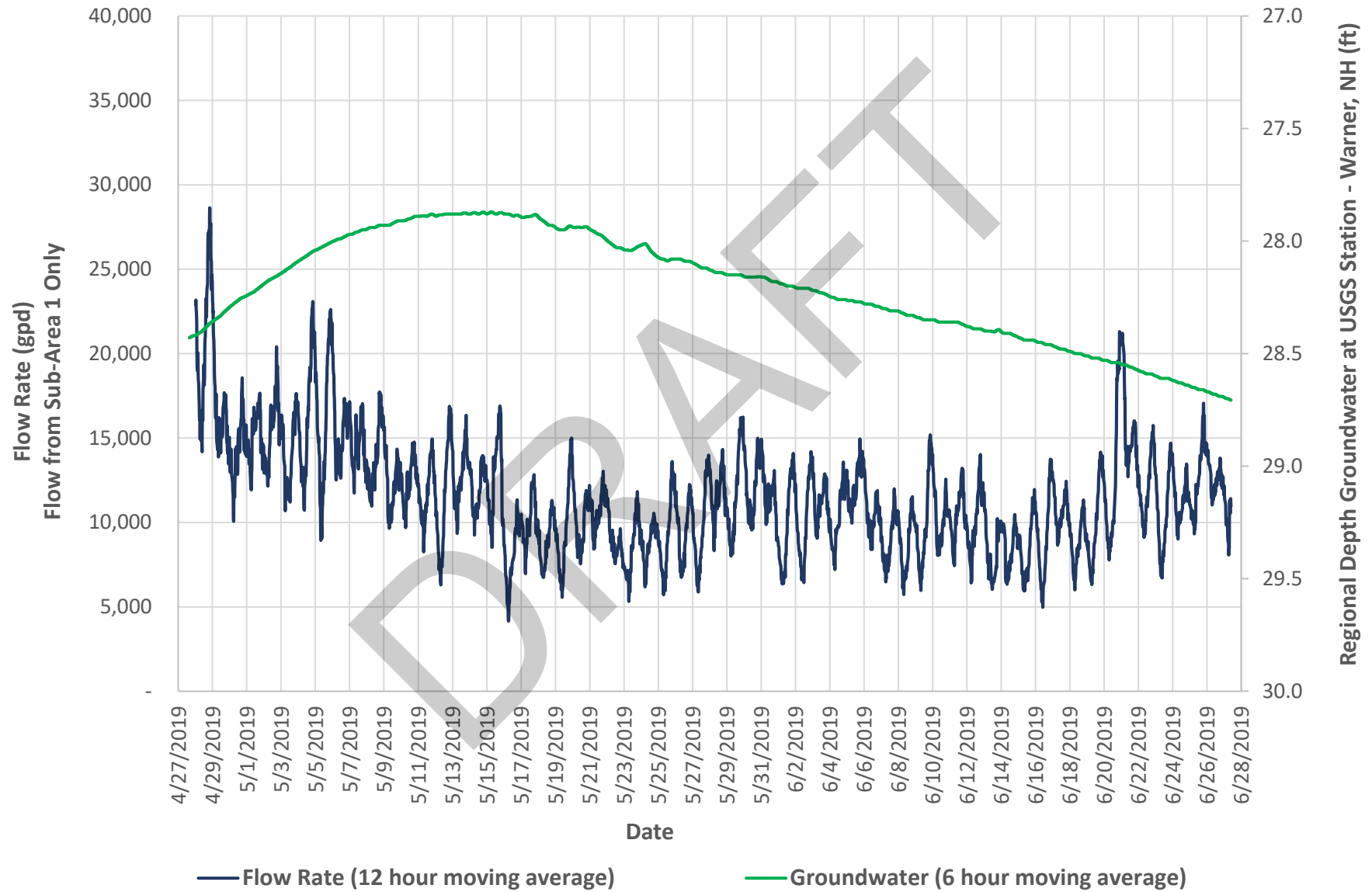


Figure 3F: Flow Meter #1 - Route 4A (Enfield, NH)

Flow Rate vs Rainfall

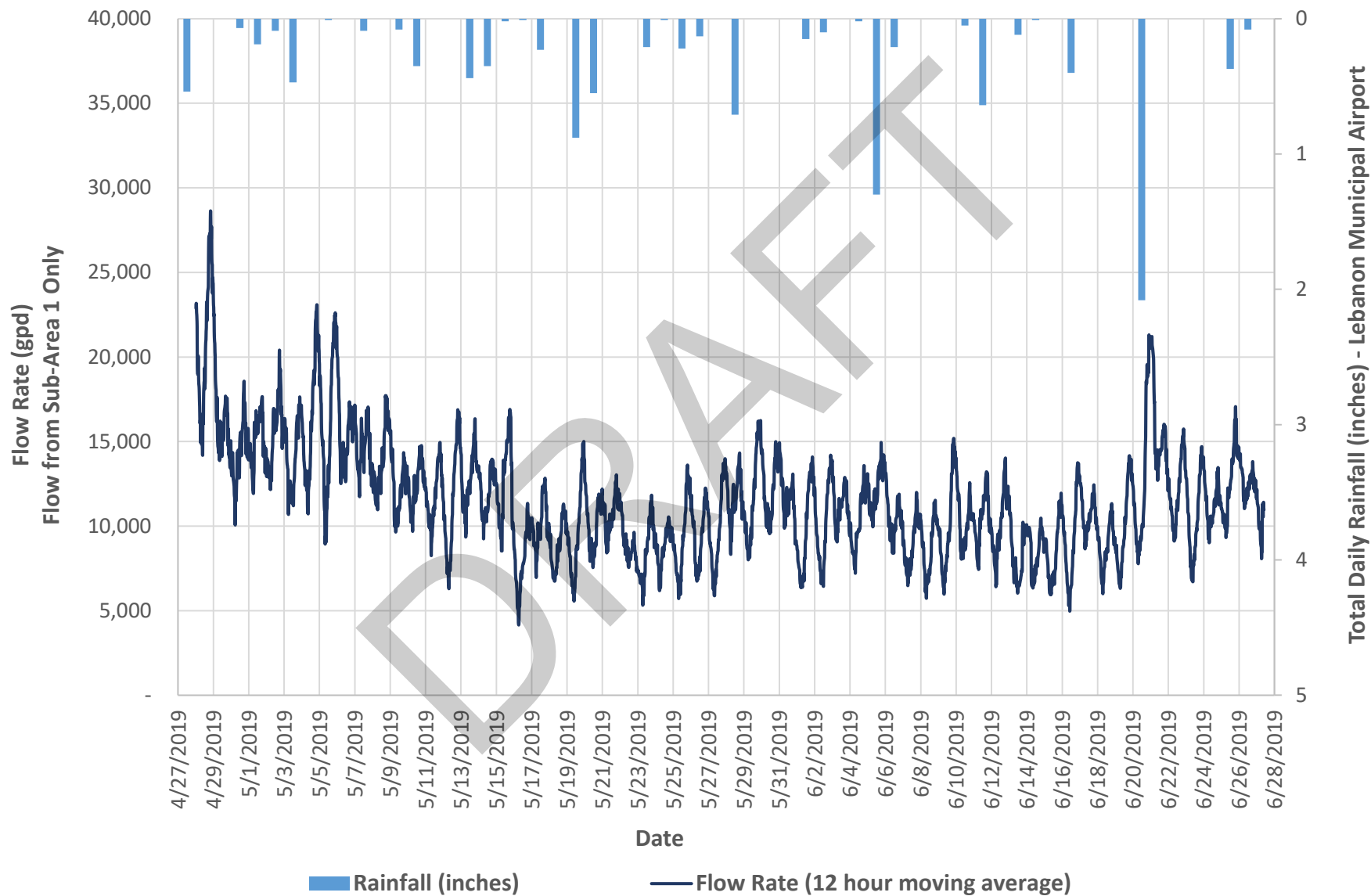


Figure 3G: Flow Meter #1 - Route 4A (Enfield, NH)
Unit Flow Rate (gpd/idm) vs Groundwater

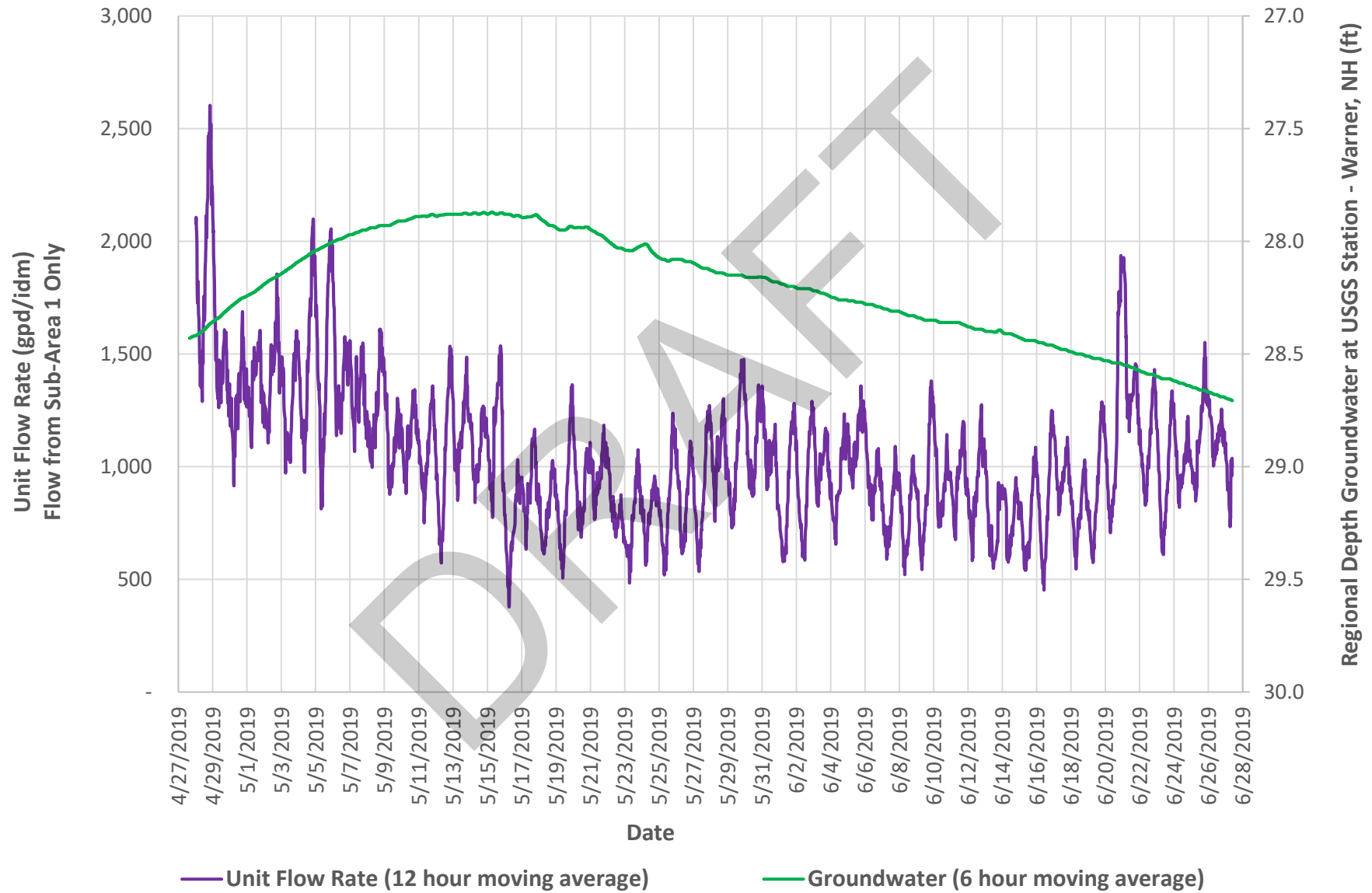


Figure 3H: Flow Meter #1 - Route 4A (Enfield, NH)

Unit Flow Rate (gpd/idm) vs Rainfall

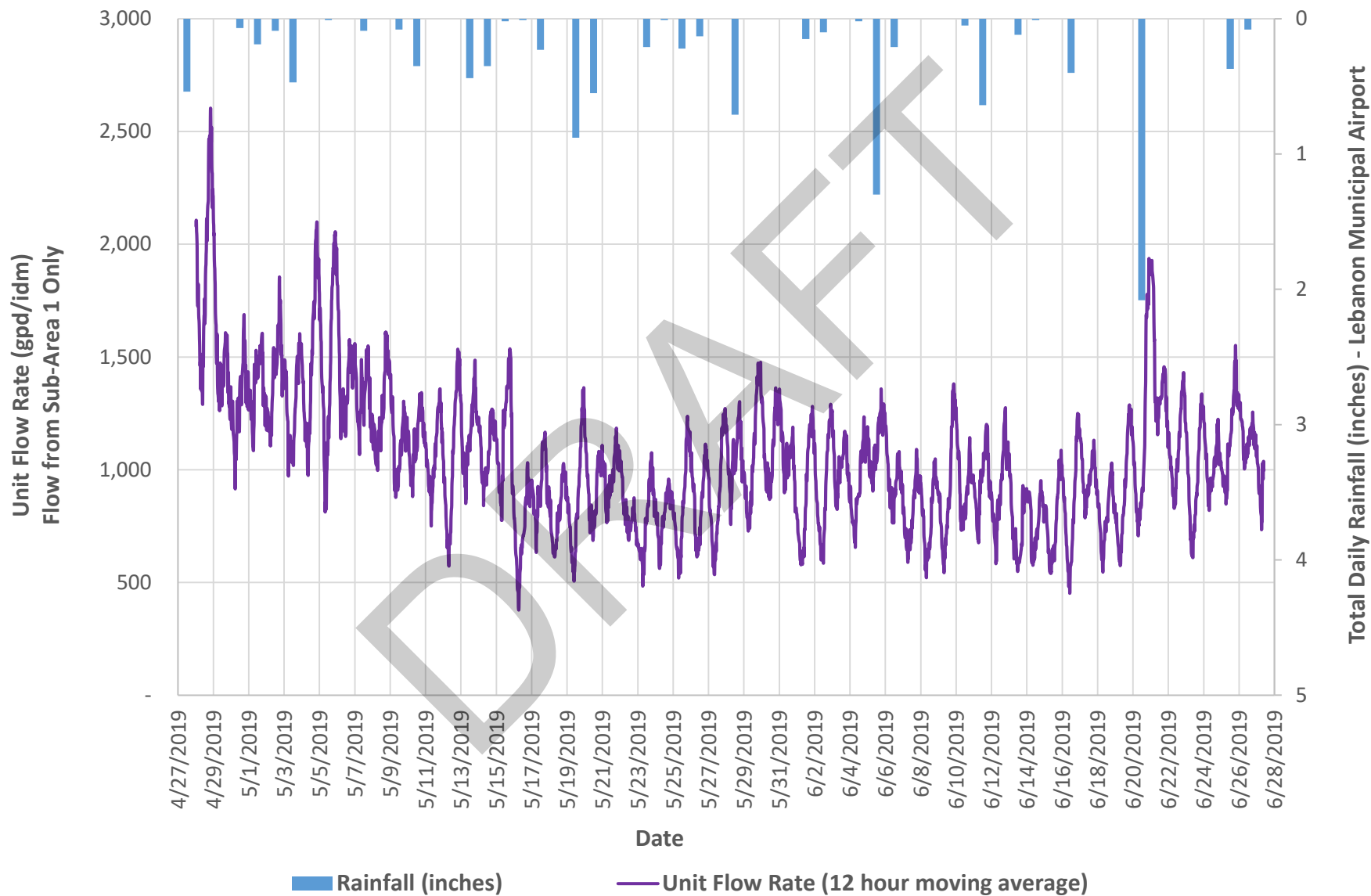


Figure 3I: Flow Meter #1 - Route 4A (Enfield, NH)
Storm Event (5/19/2019)

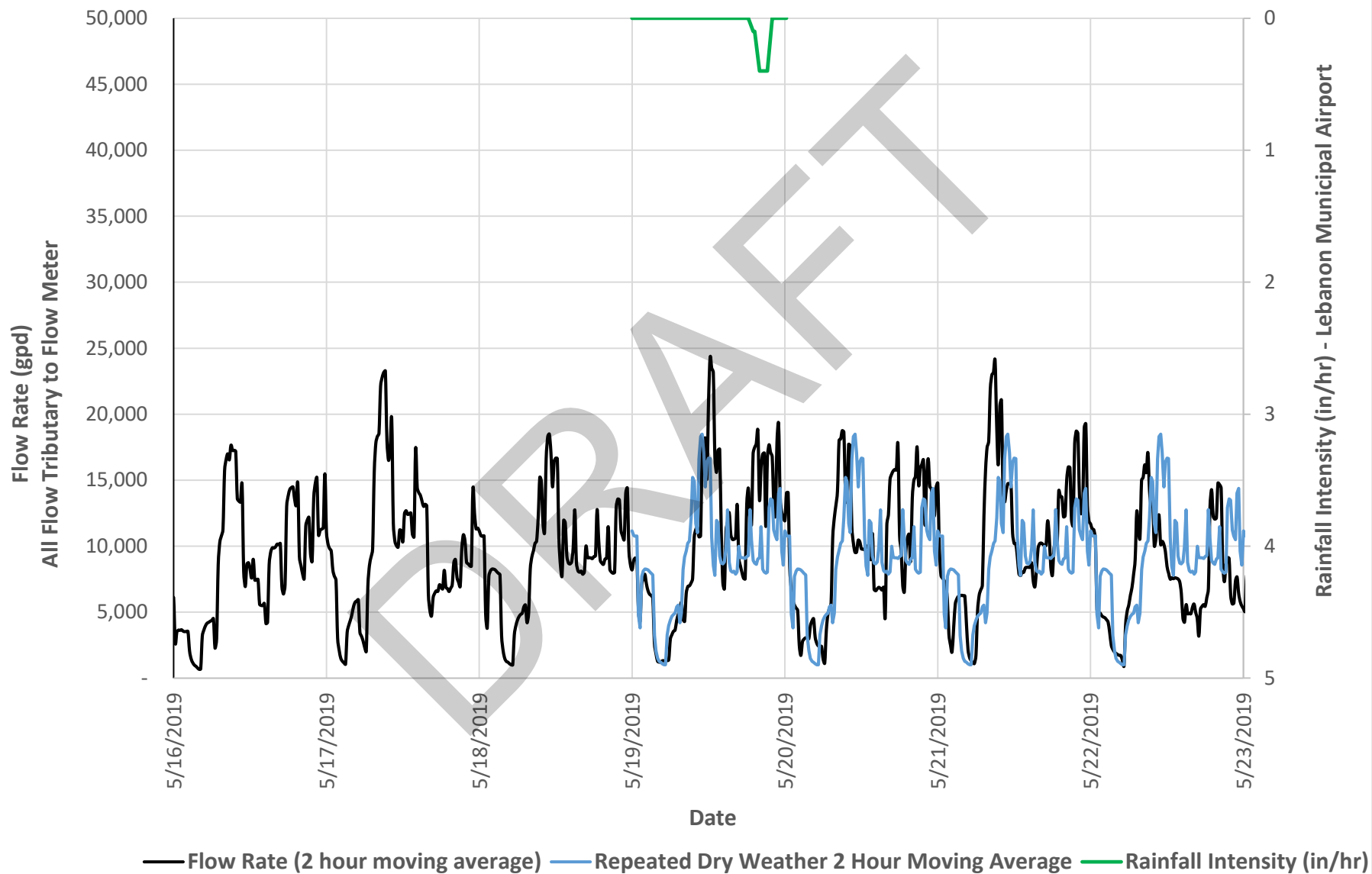


Figure 3J: Flow Meter #1 - Route 4A (Enfield, NH)
Storm Event (6/5/2019)

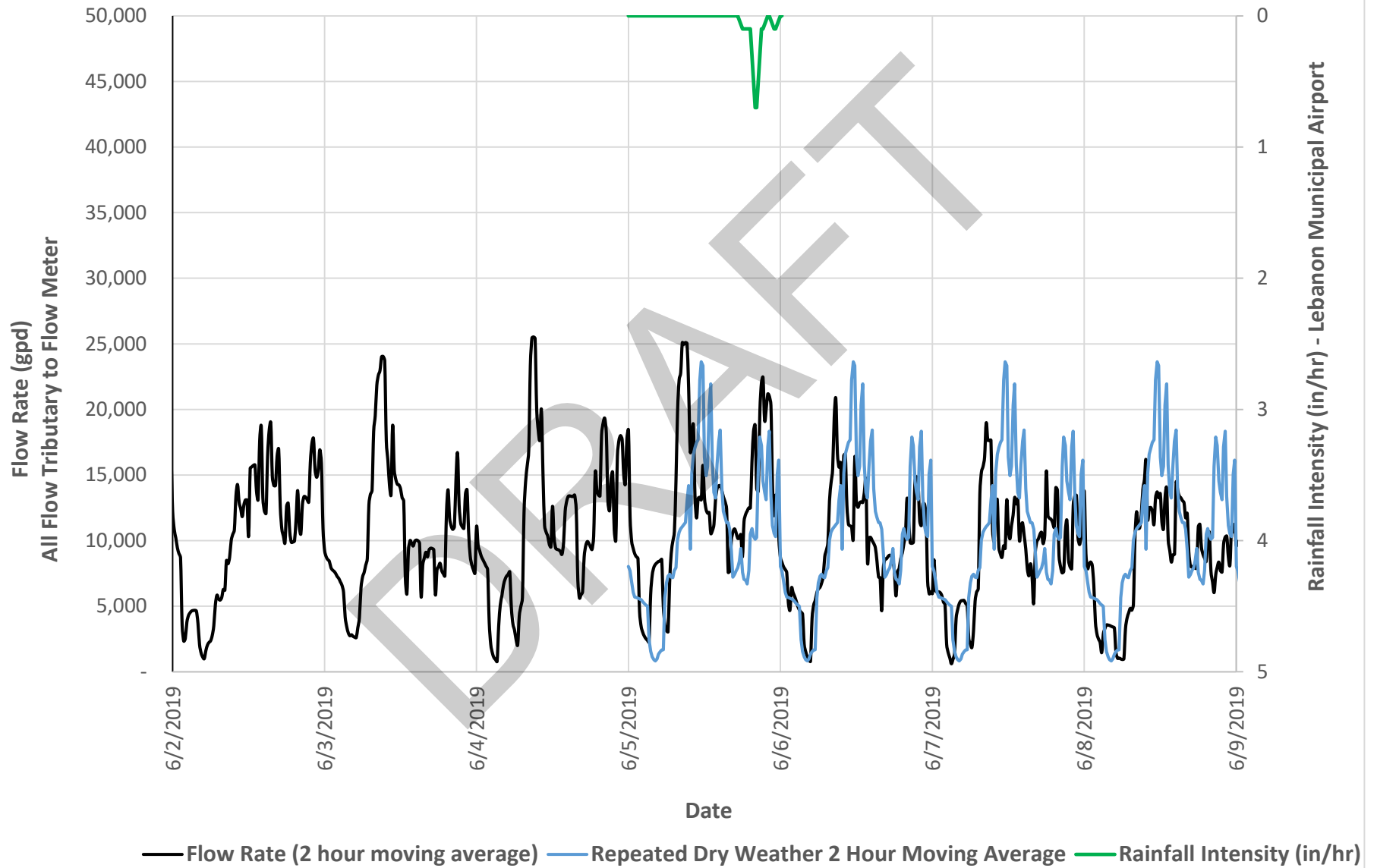


Figure 3K: Flow Meter #1 - Route 4A (Enfield, NH)
Storm Event (6/20/2019)

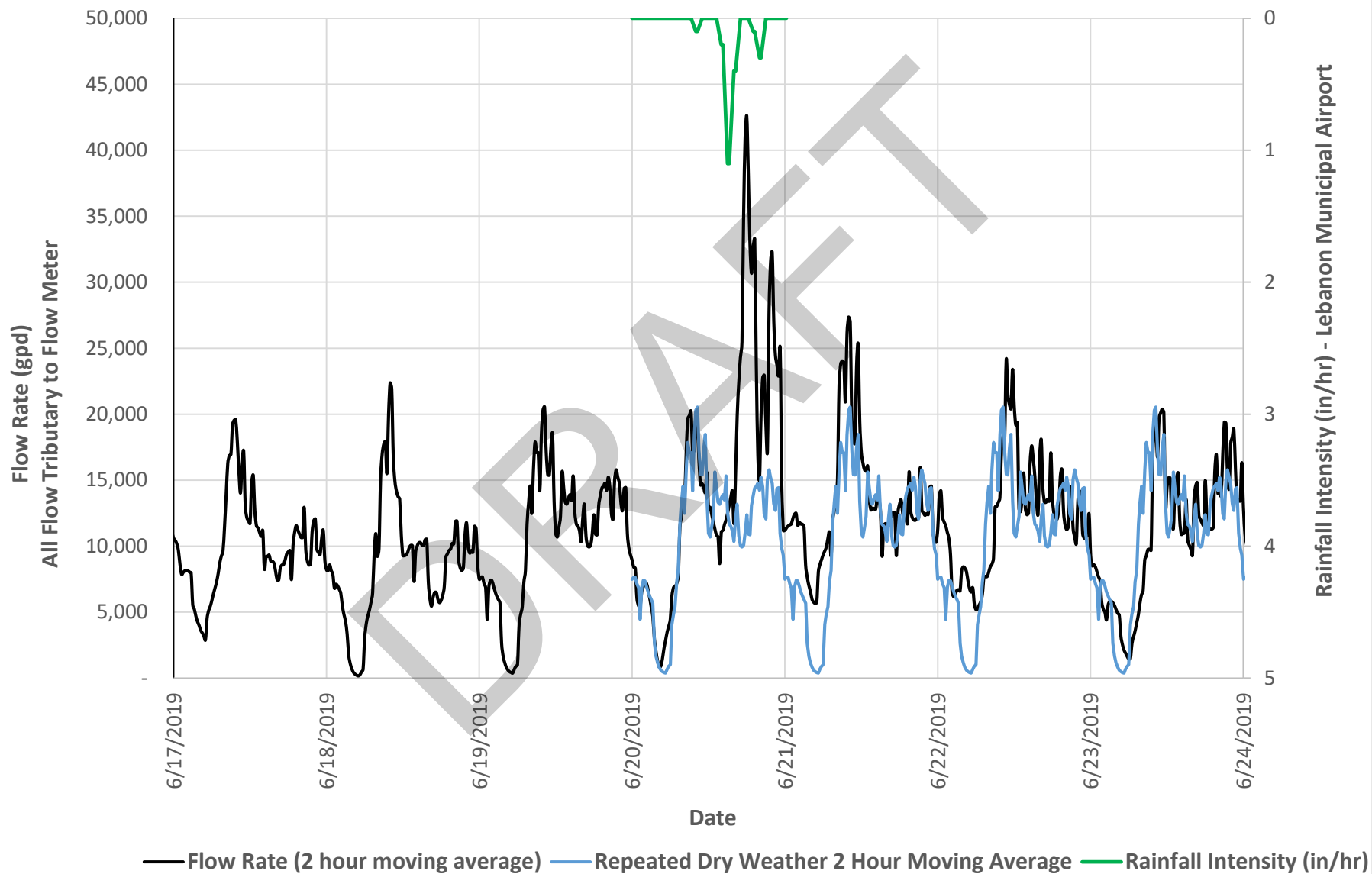


Figure 4A: Flow Meter #2 - Route 4 (Enfield, NH)
Flow Rate vs Groundwater



Figure 4B: Flow Meter #2 - Route 4 (Enfield, NH)

Flow Rate vs Rainfall

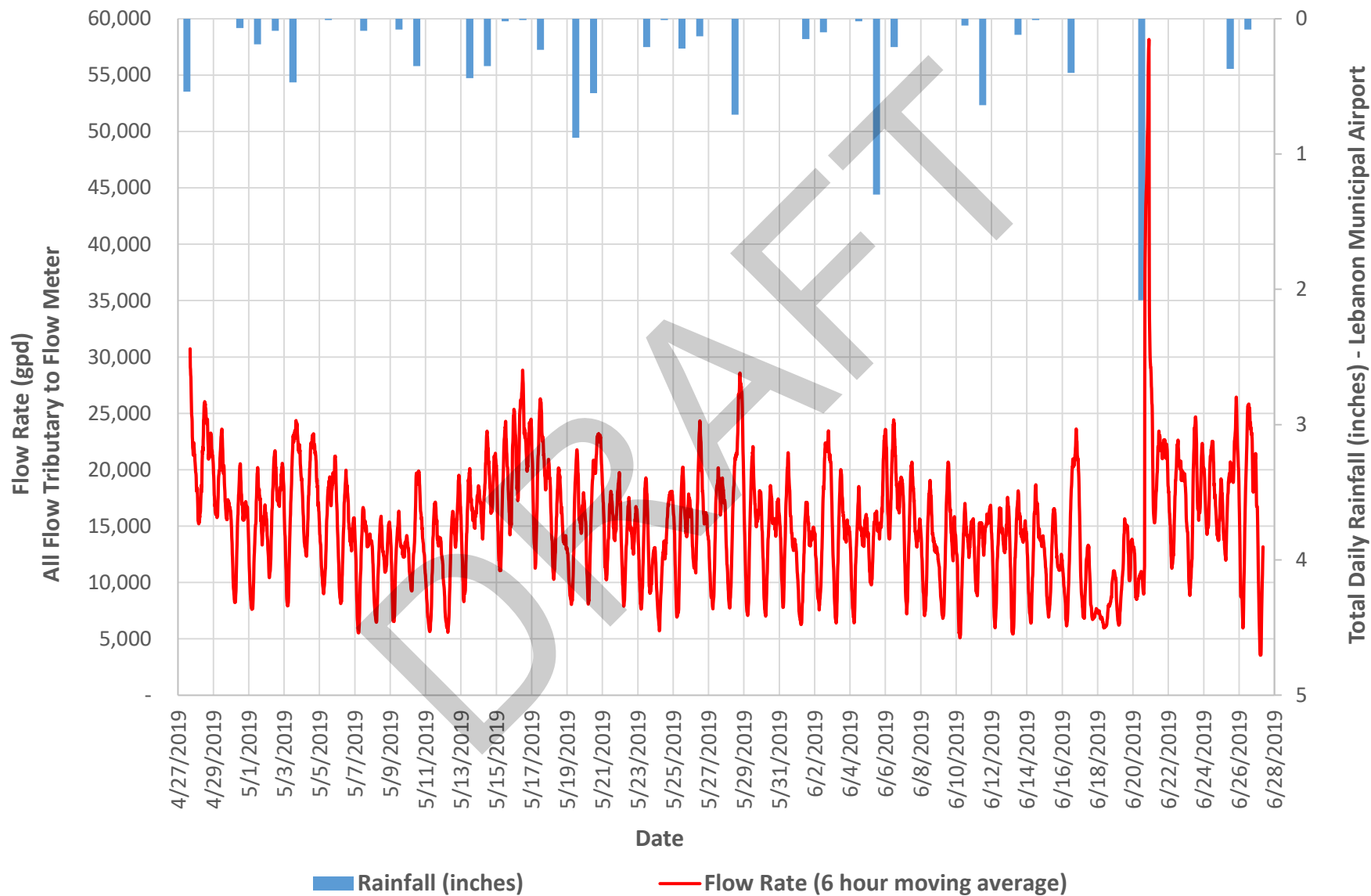


Figure 4C: Flow Meter #2 - Route 4 (Enfield, NH)
Flow Rate vs Groundwater

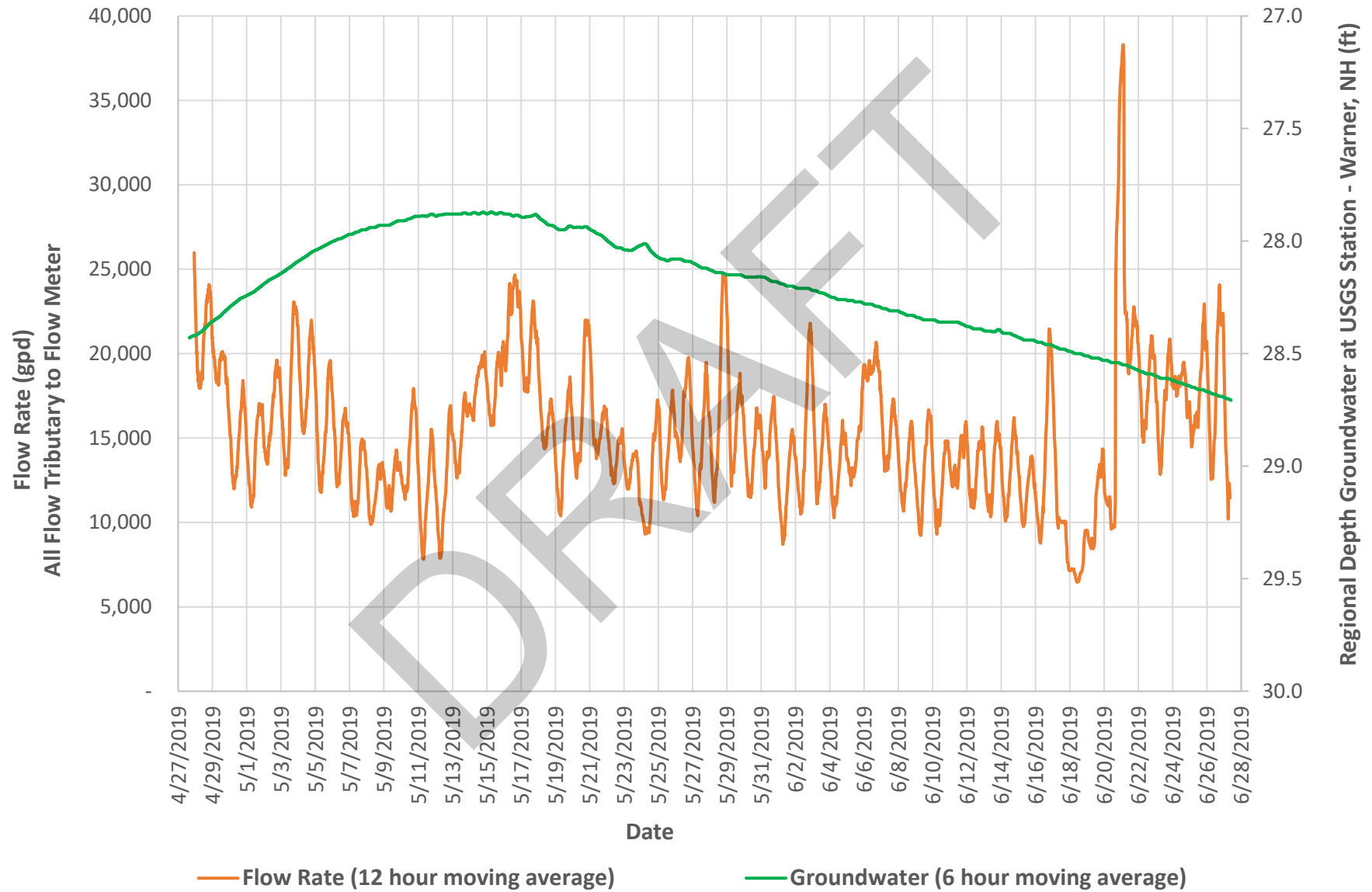


Figure 4D: Flow Meter #2 - Route 4 (Enfield, NH)

Flow Rate vs Rainfall

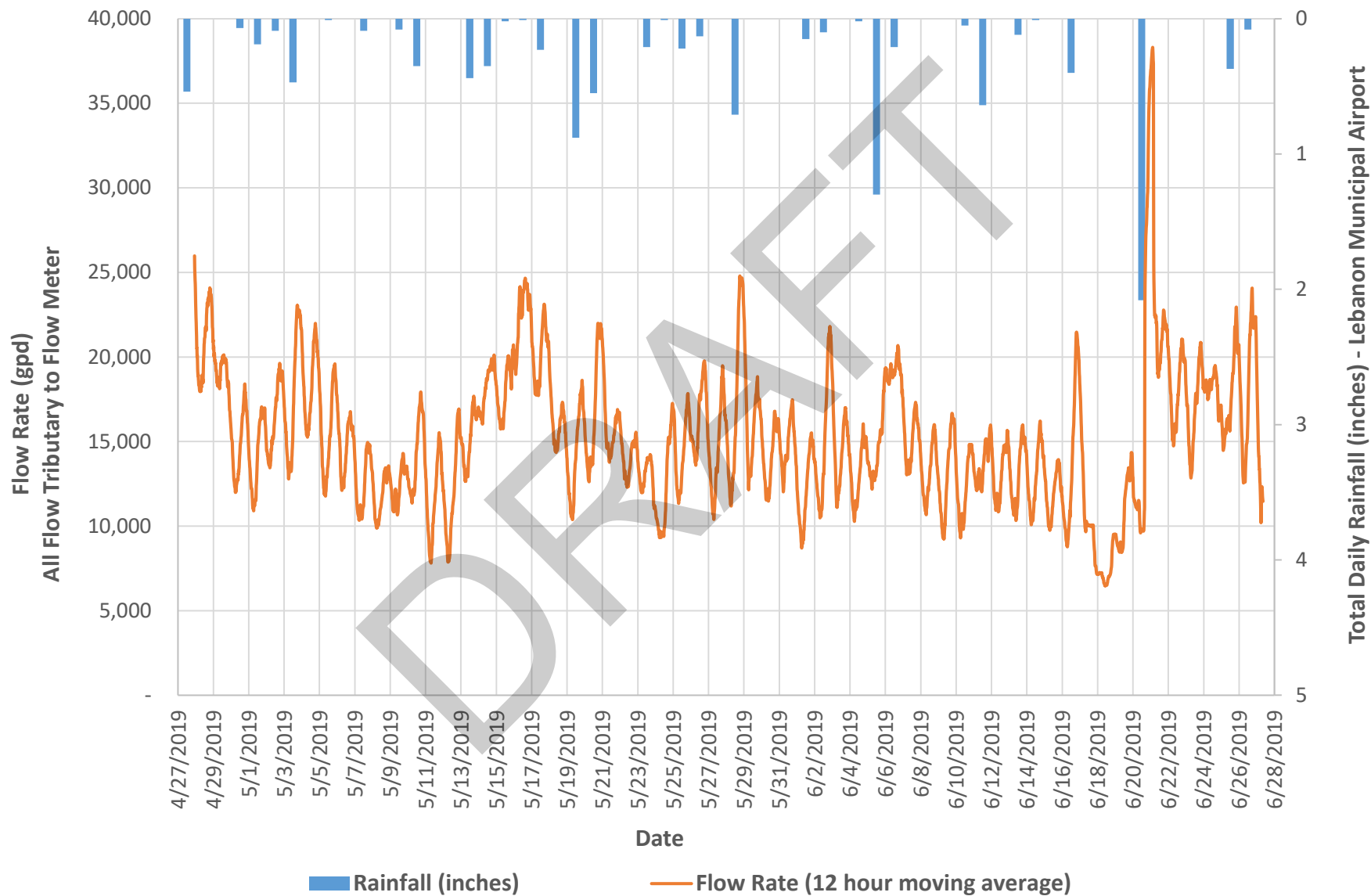


Figure 4E: Flow Meter #2 - Route 4 (Enfield, NH)
Flow Rate vs Groundwater

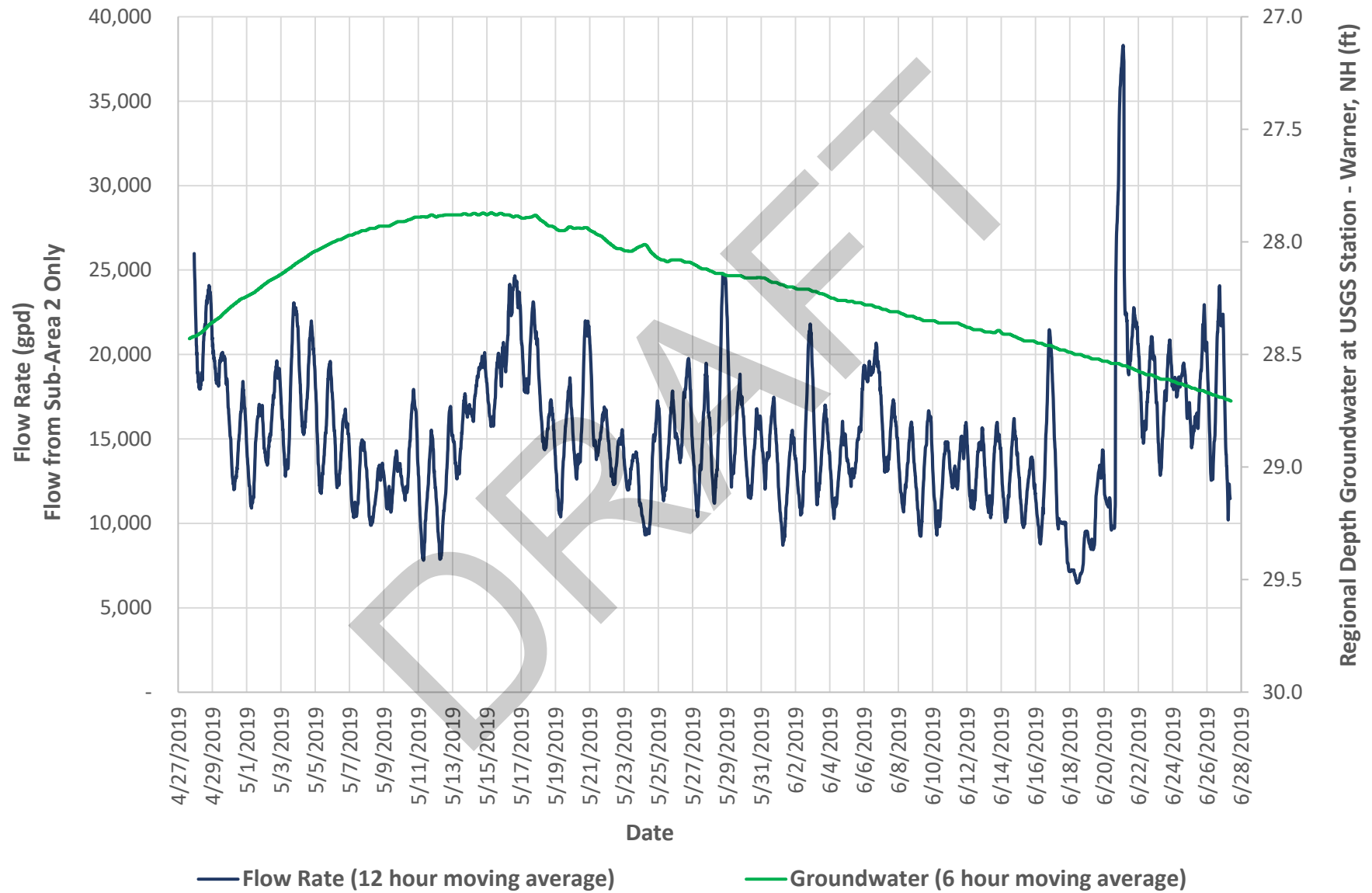


Figure 4F: Flow Meter #2 - Route 4 (Enfield, NH)

Flow Rate vs Rainfall

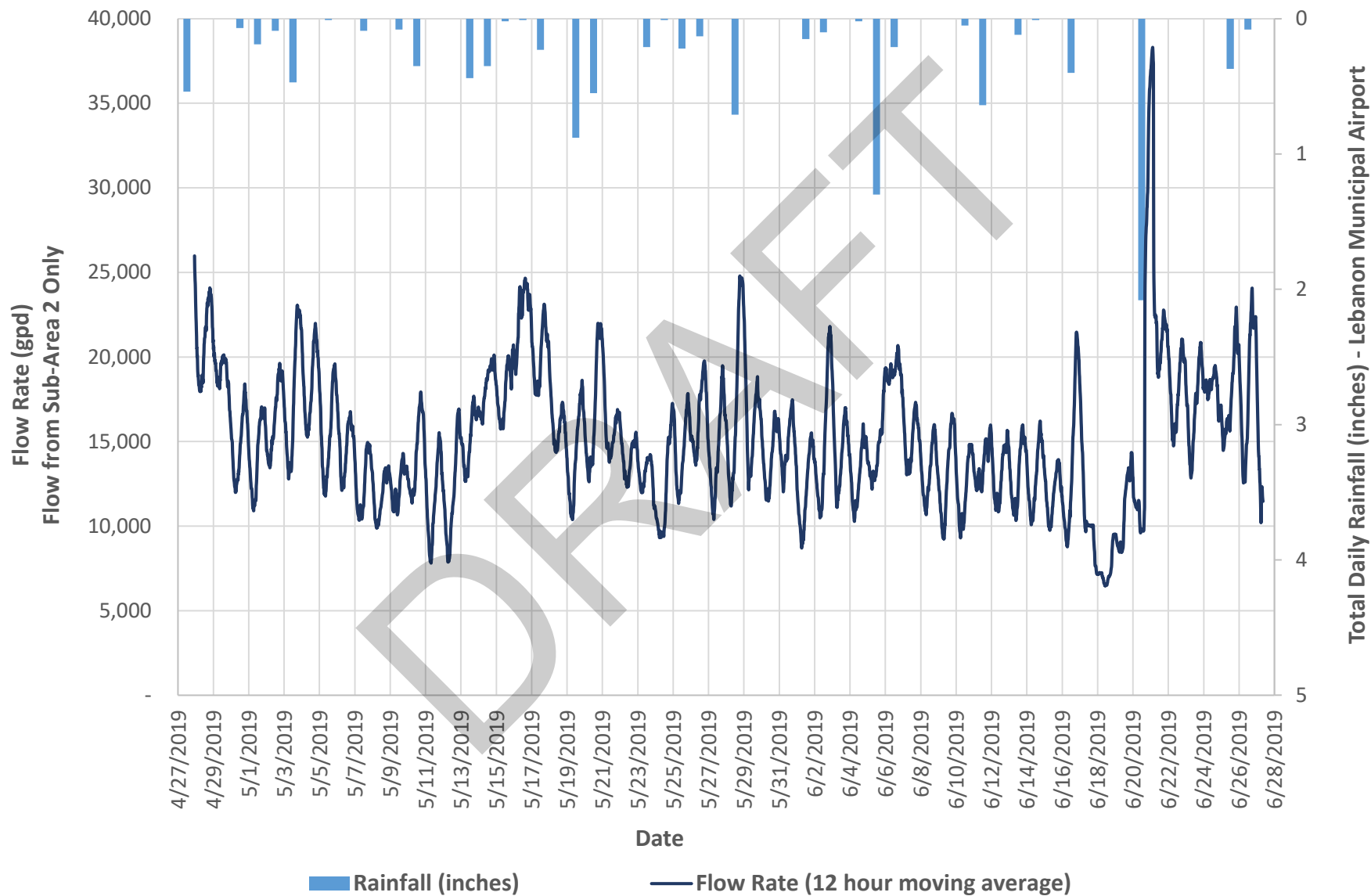


Figure 4G: Flow Meter #2 - Route 4 (Enfield, NH)
Unit Flow Rate (gpd/idm) vs Groundwater

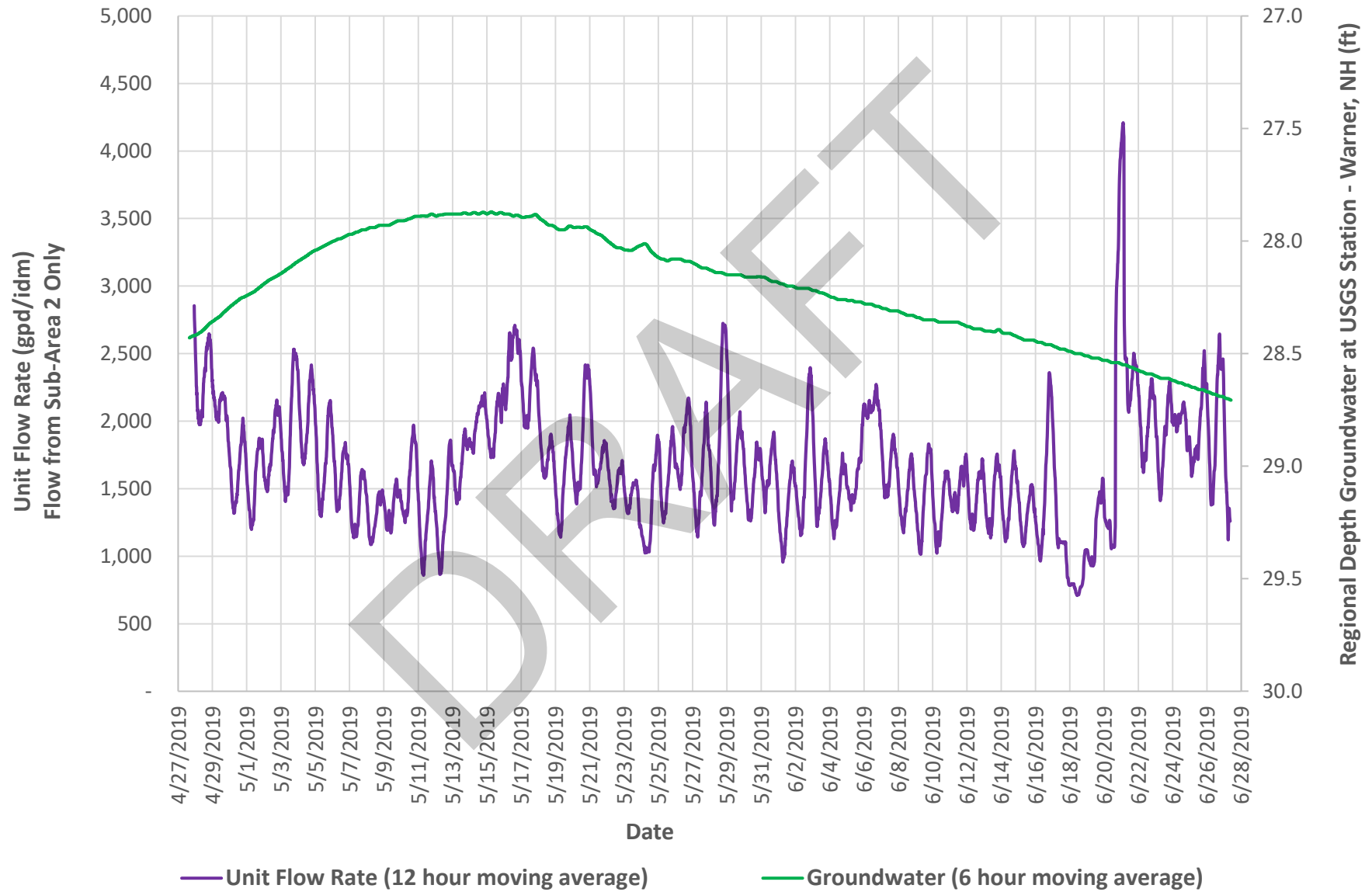


Figure 4H: Flow Meter #2 - Route 4 (Enfield, NH)

Unit Flow Rate (gpd/idm) vs Rainfall

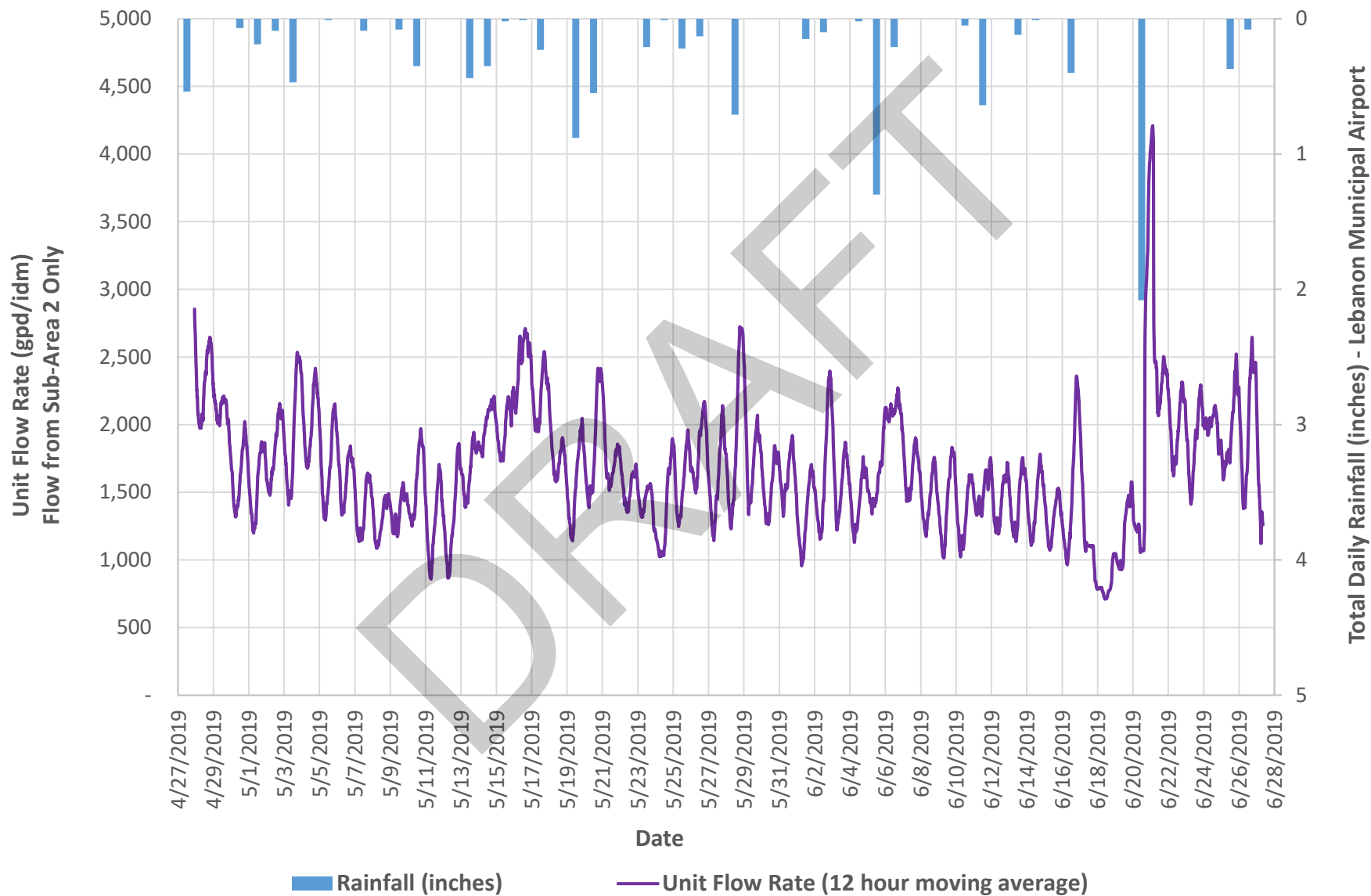


Figure 4I: Flow Meter #2 - Route 4 (Enfield, NH)
Storm Event (5/19/2019)

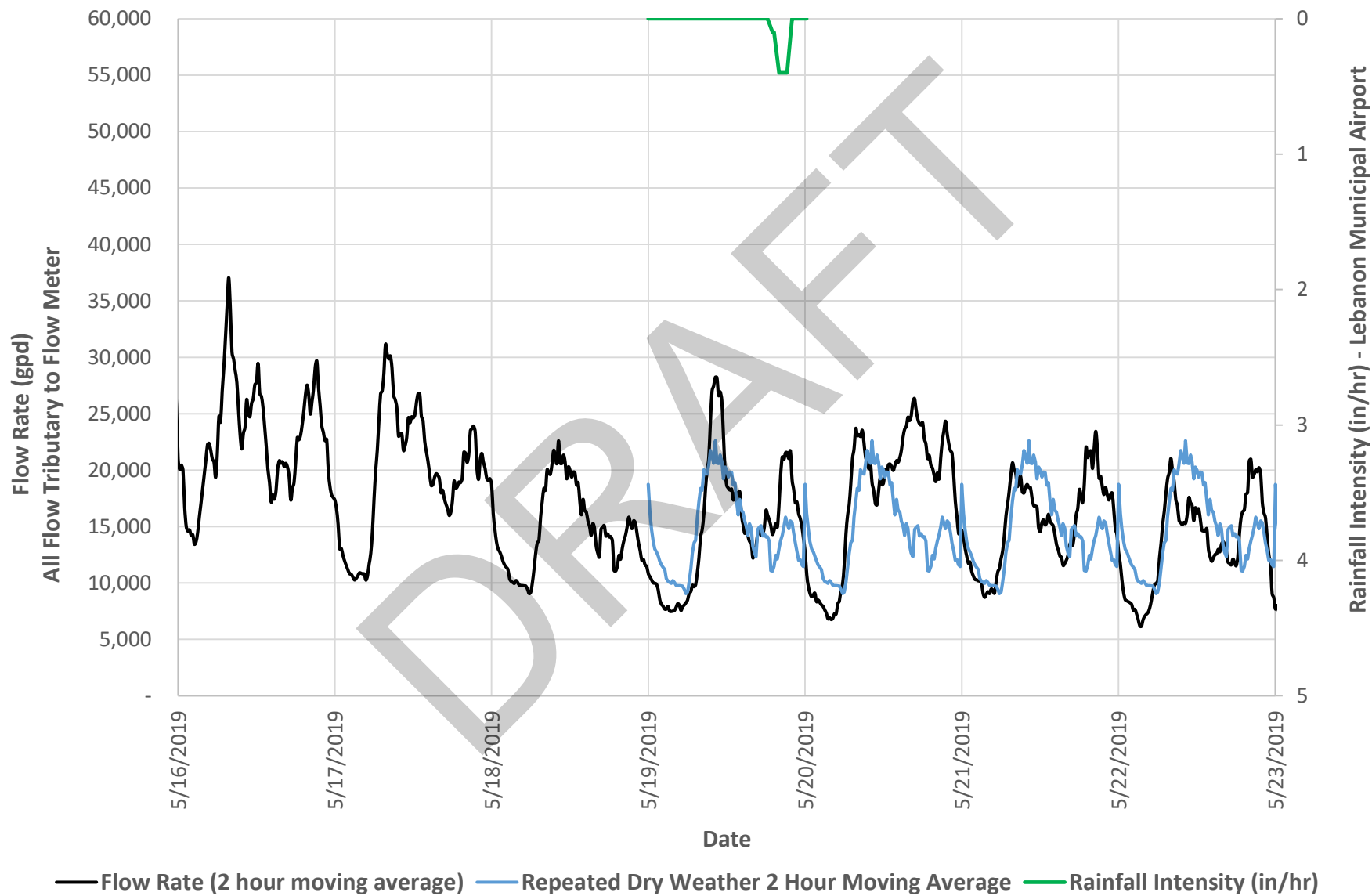


Figure 4J: Flow Meter #2 - Route 4 (Enfield, NH)
Storm Event (6/5/2019)

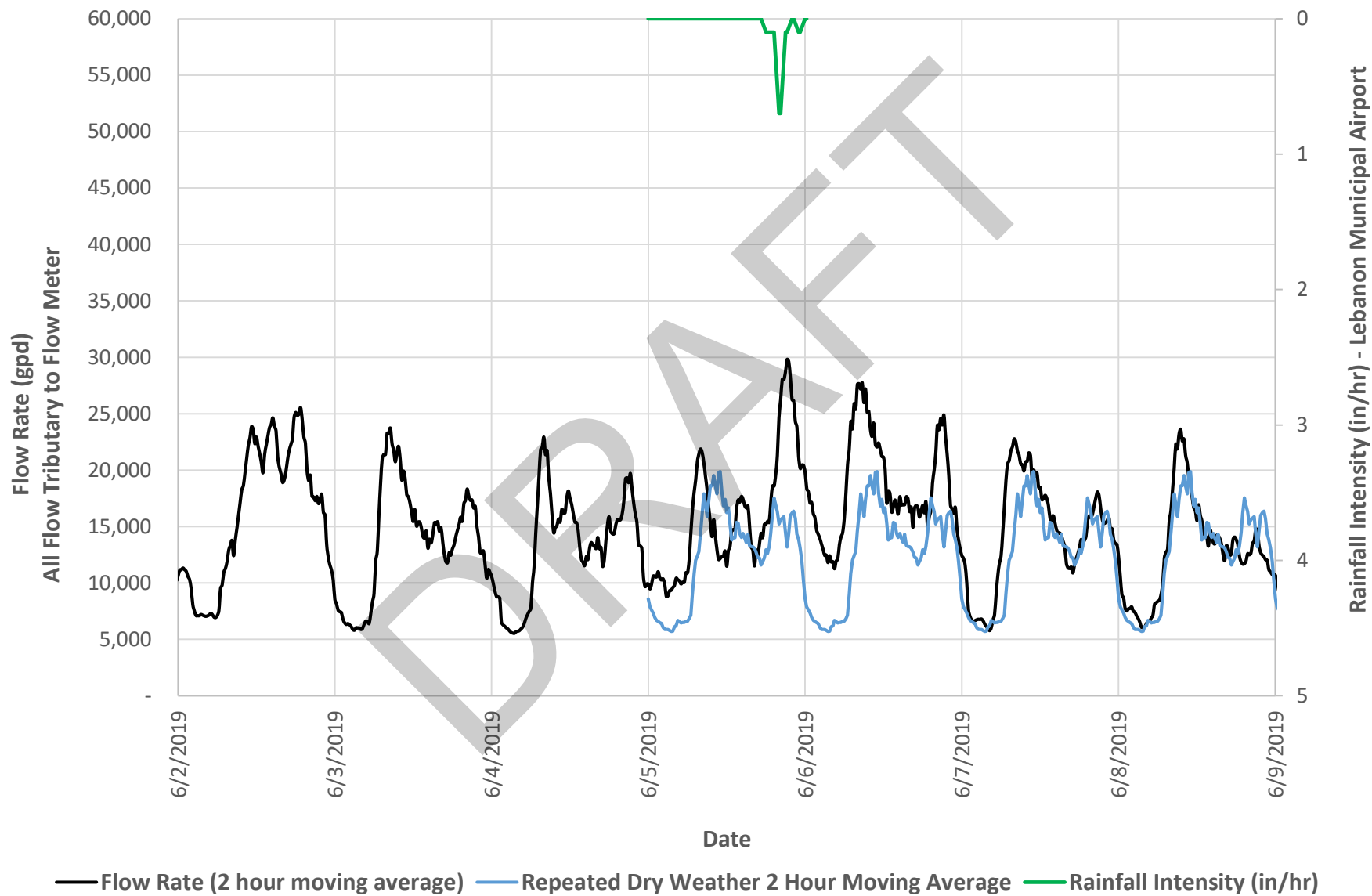


Figure 4K: Flow Meter #2 - Route 4 (Enfield, NH)
Storm Event (6/20/2019)

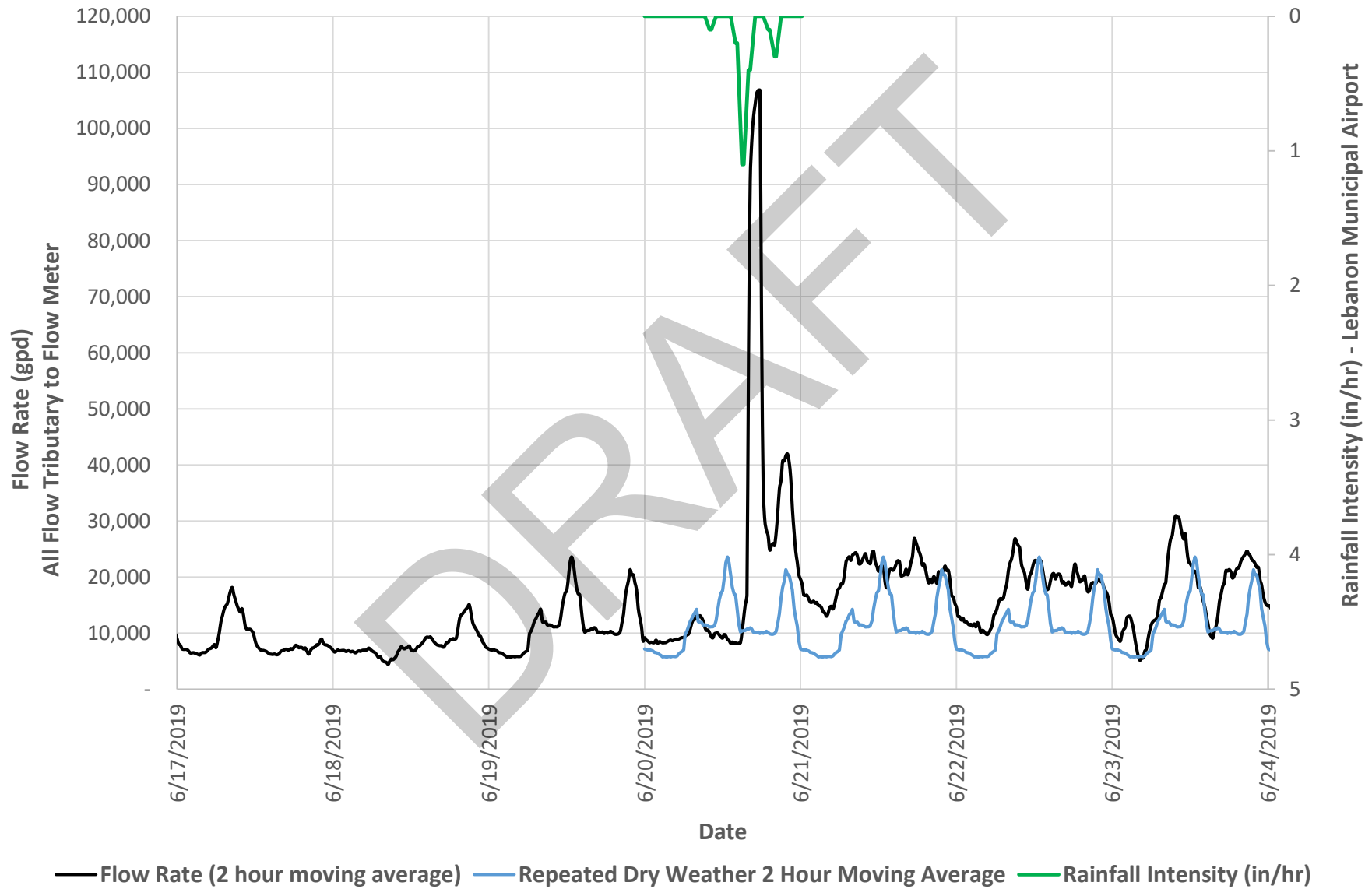


Figure 5A: Flow Meter #3 - Main Street (Enfield, NH)
Flow Rate vs Groundwater

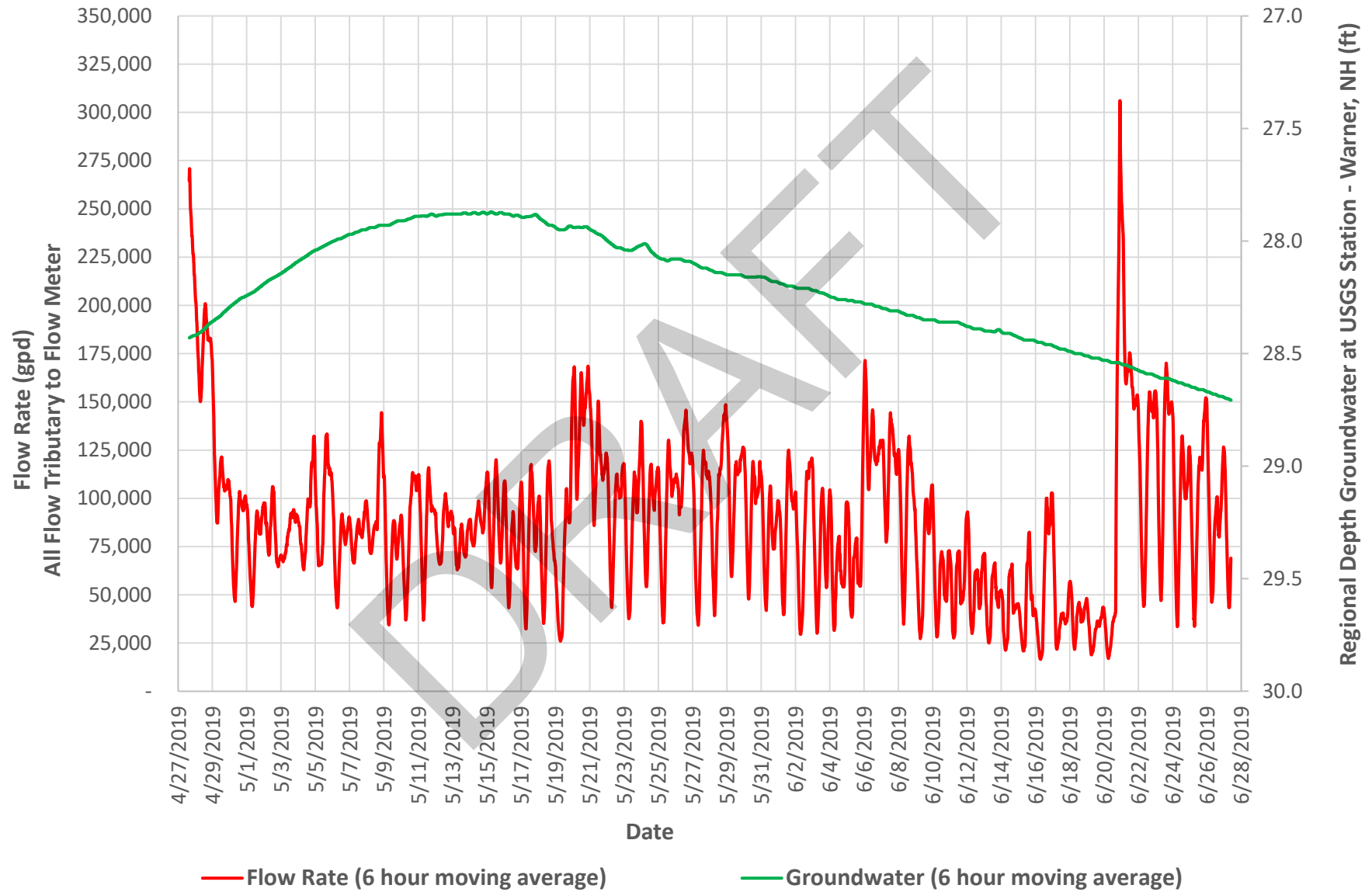


Figure 5B: Flow Meter #3 - Main Street (Enfield, NH)

Flow Rate vs Rainfall

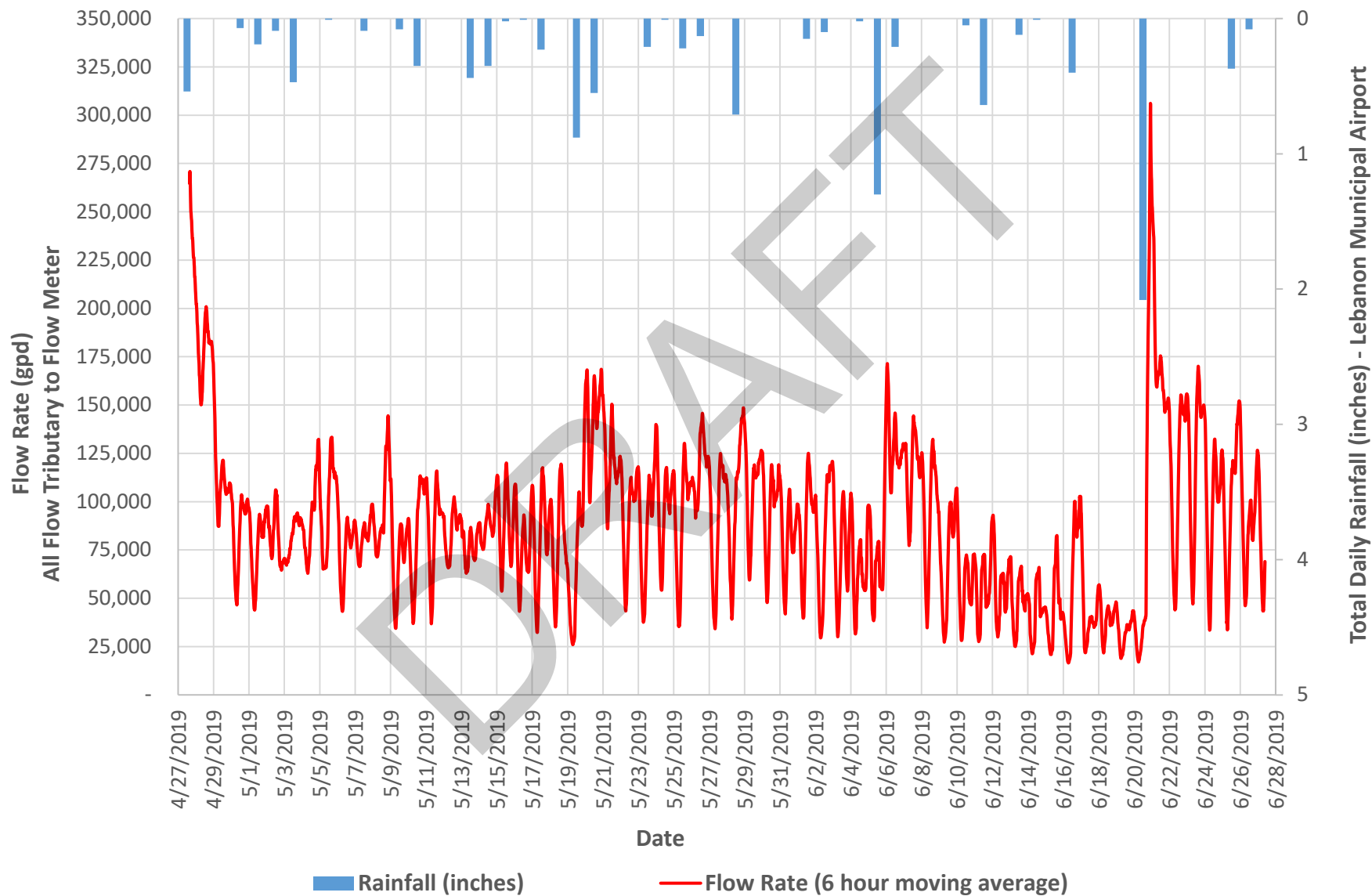


Figure 5C: Flow Meter #3 - Main Street (Enfield, NH)
Flow Rate vs Groundwater

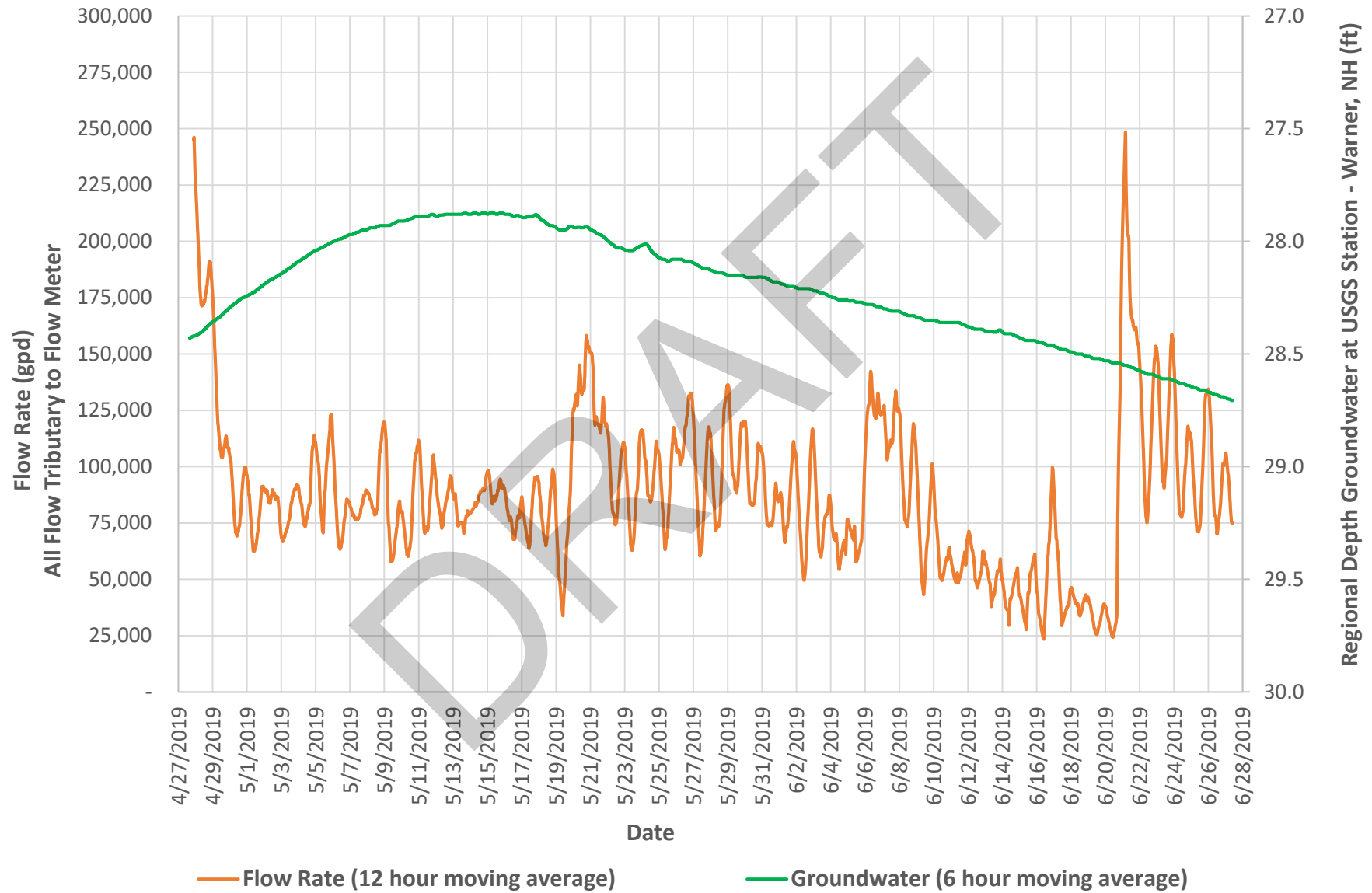


Figure 5D: Flow Meter #3 - Main Street (Enfield, NH)

Flow Rate vs Rainfall

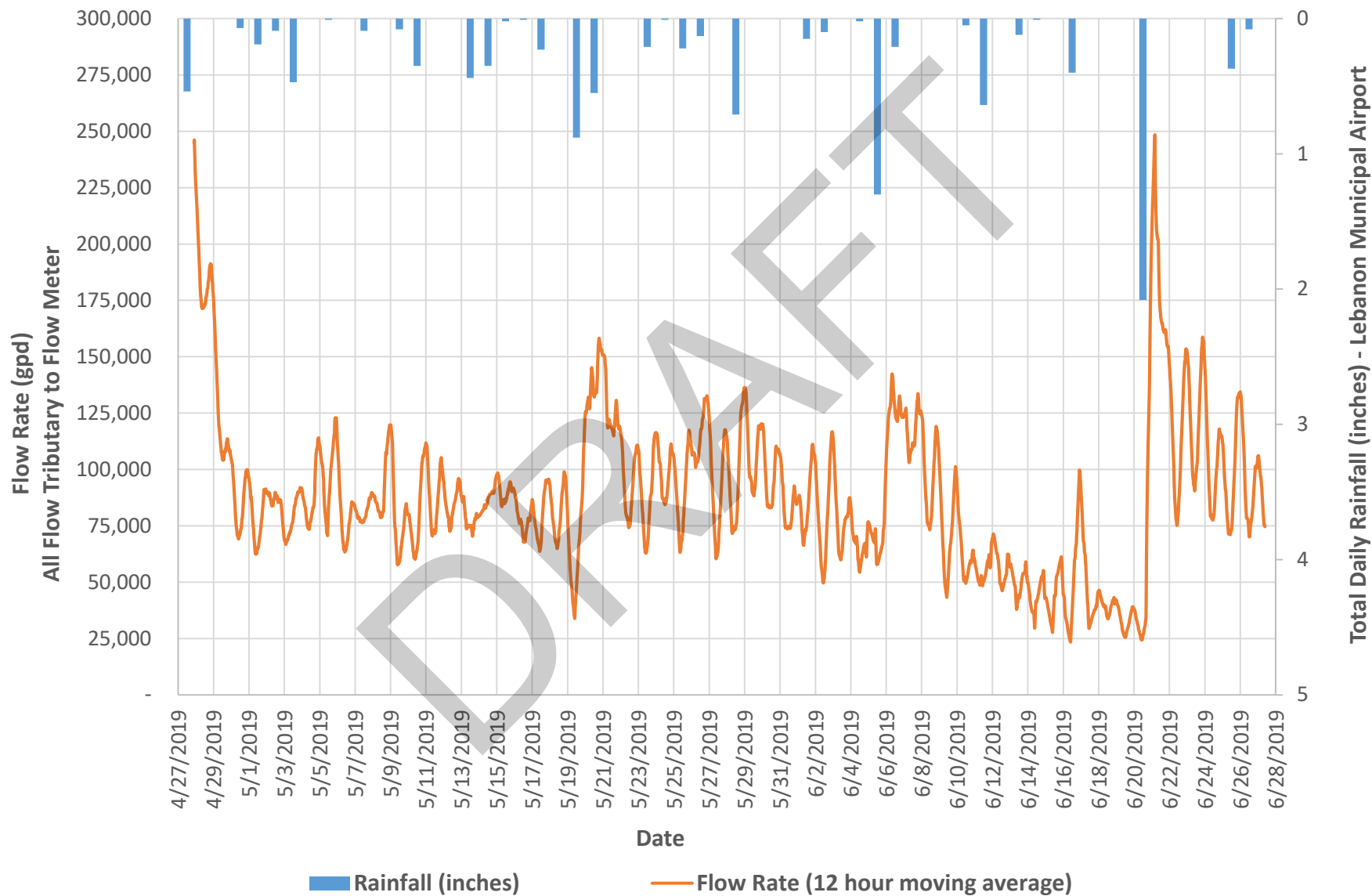


Figure 5E: Flow Meter #3 - Main Street (Enfield, NH)
Flow Rate vs Groundwater

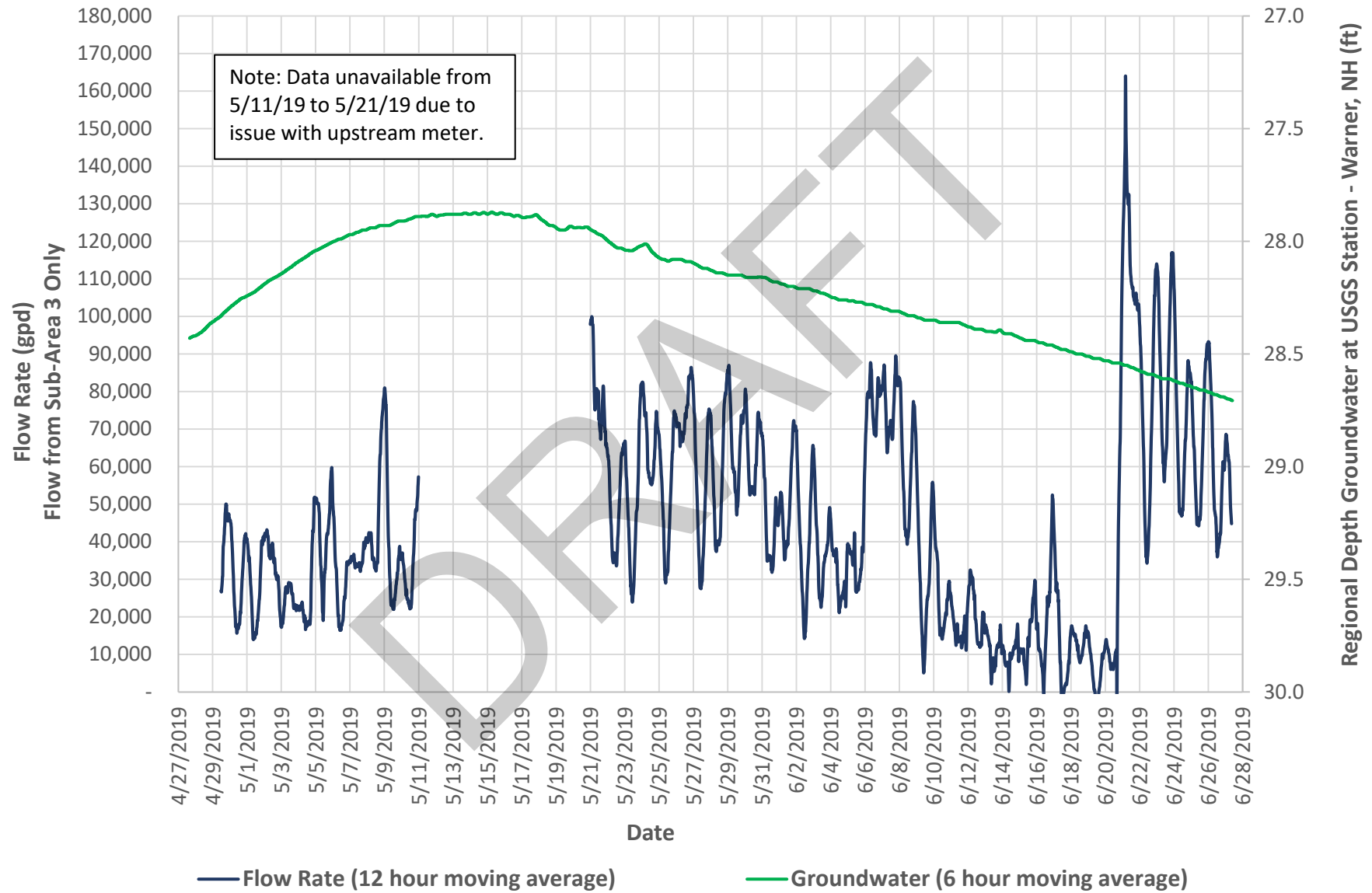


Figure 5F: Flow Meter #3 - Main Street (Enfield, NH)

Flow Rate vs Rainfall

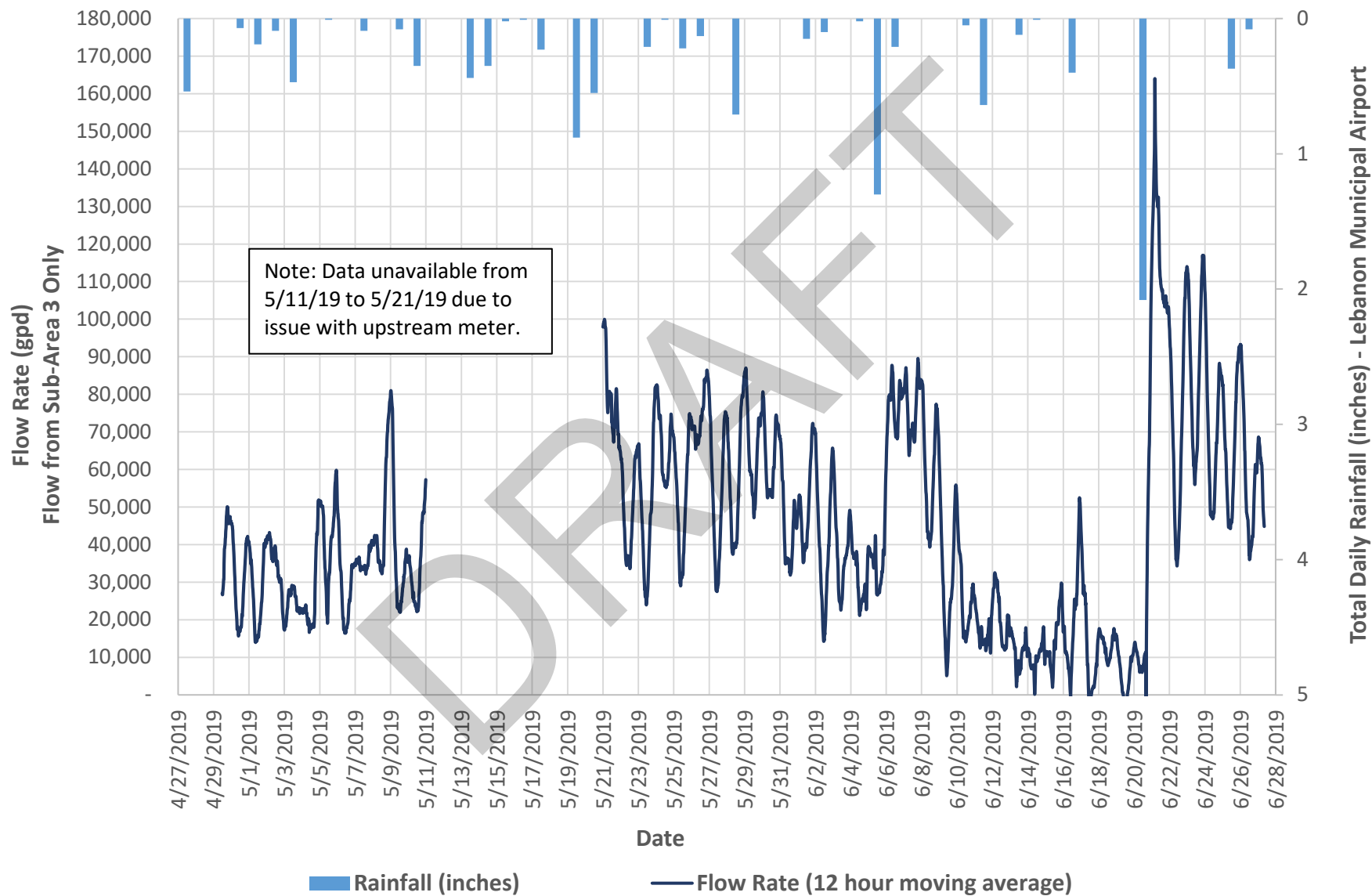


Figure 5G: Flow Meter #3 - Main Street (Enfield, NH)
Unit Flow Rate (gpd/idm) vs Groundwater

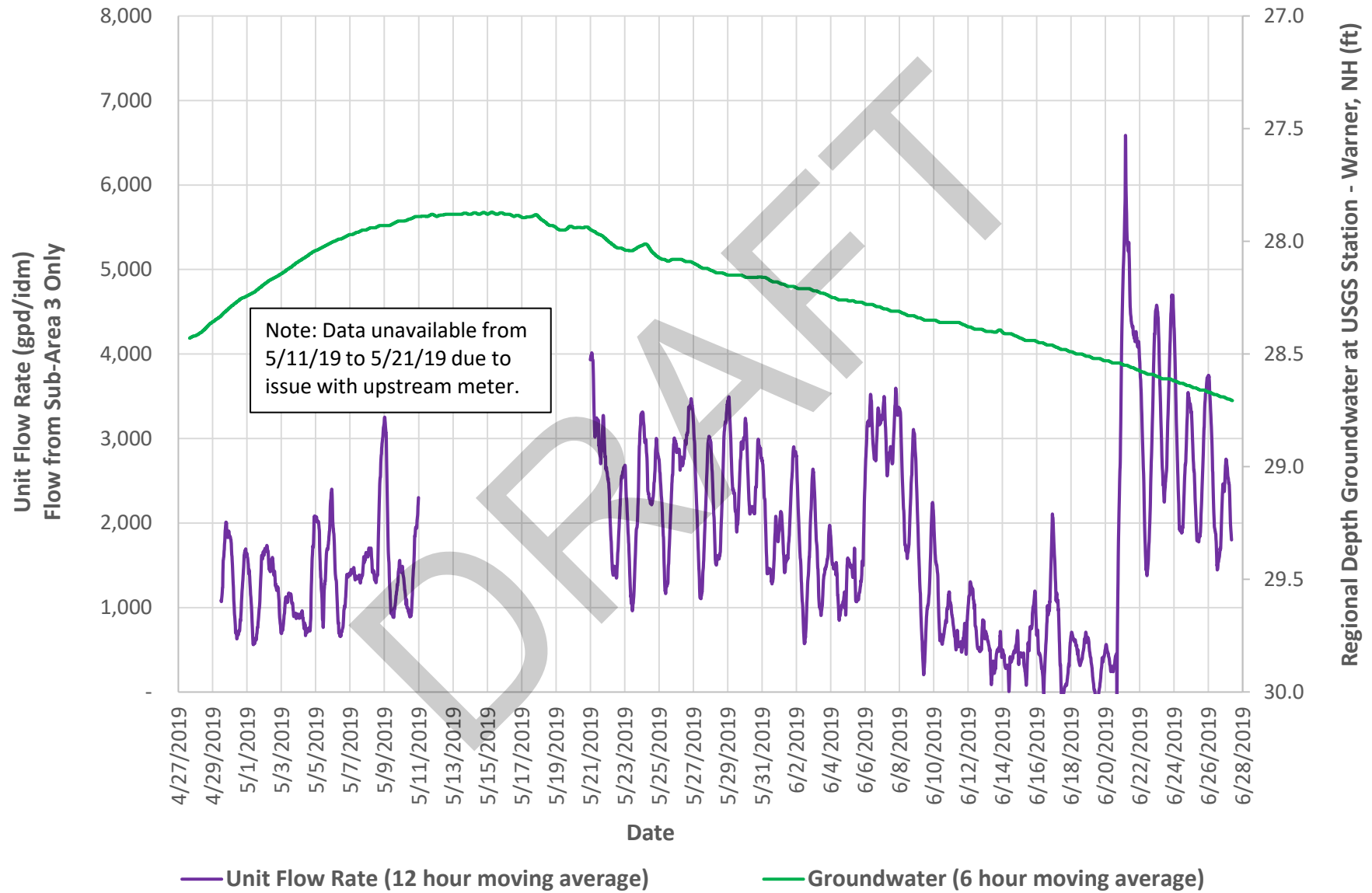


Figure 5H: Flow Meter #3 - Main Street (Enfield, NH)

Unit Flow Rate (gpd/idm) vs Rainfall

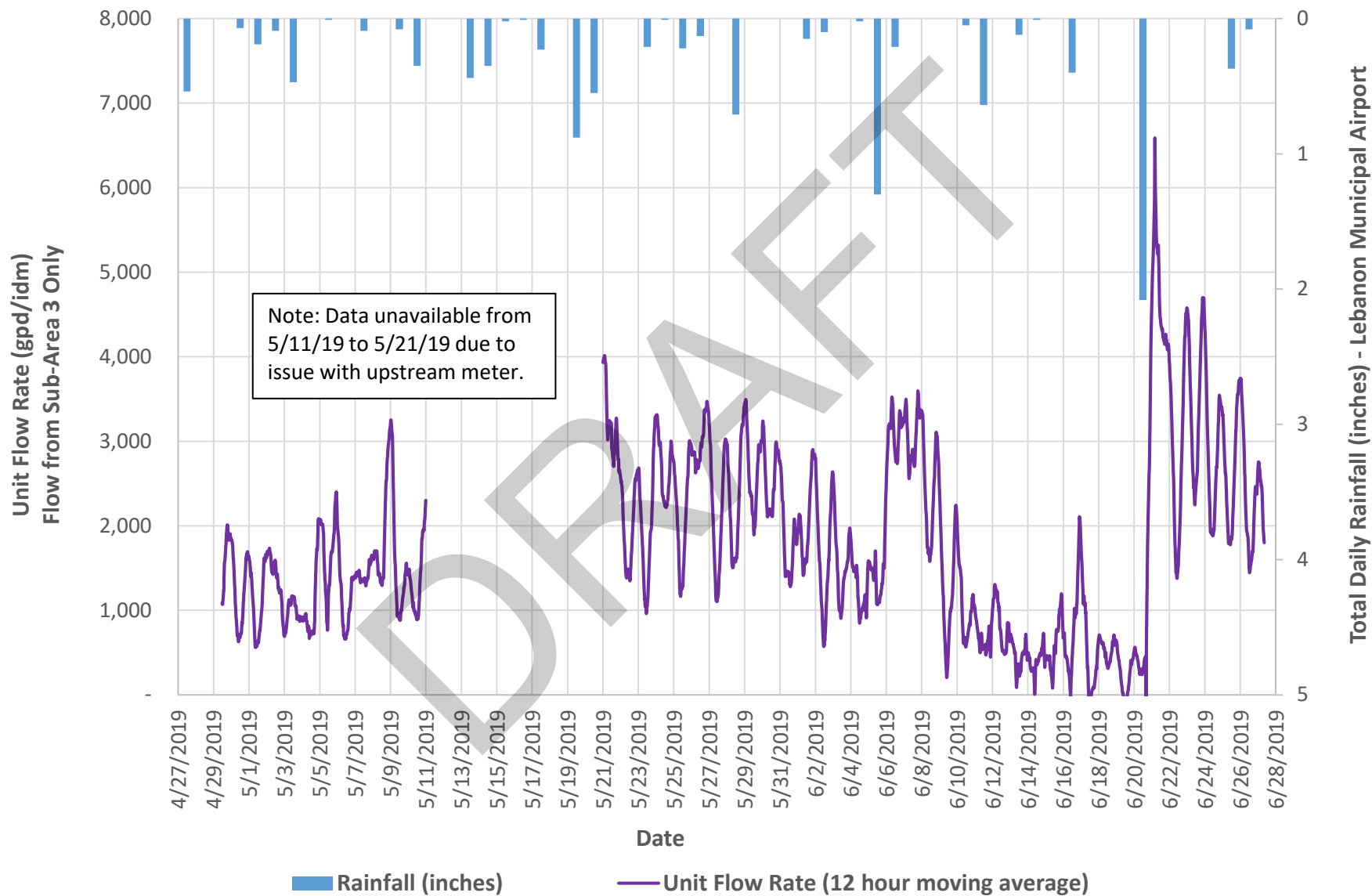


Figure 5I: Flow Meter #3 - Main Street (Enfield, NH)
Storm Event (5/19/2019)

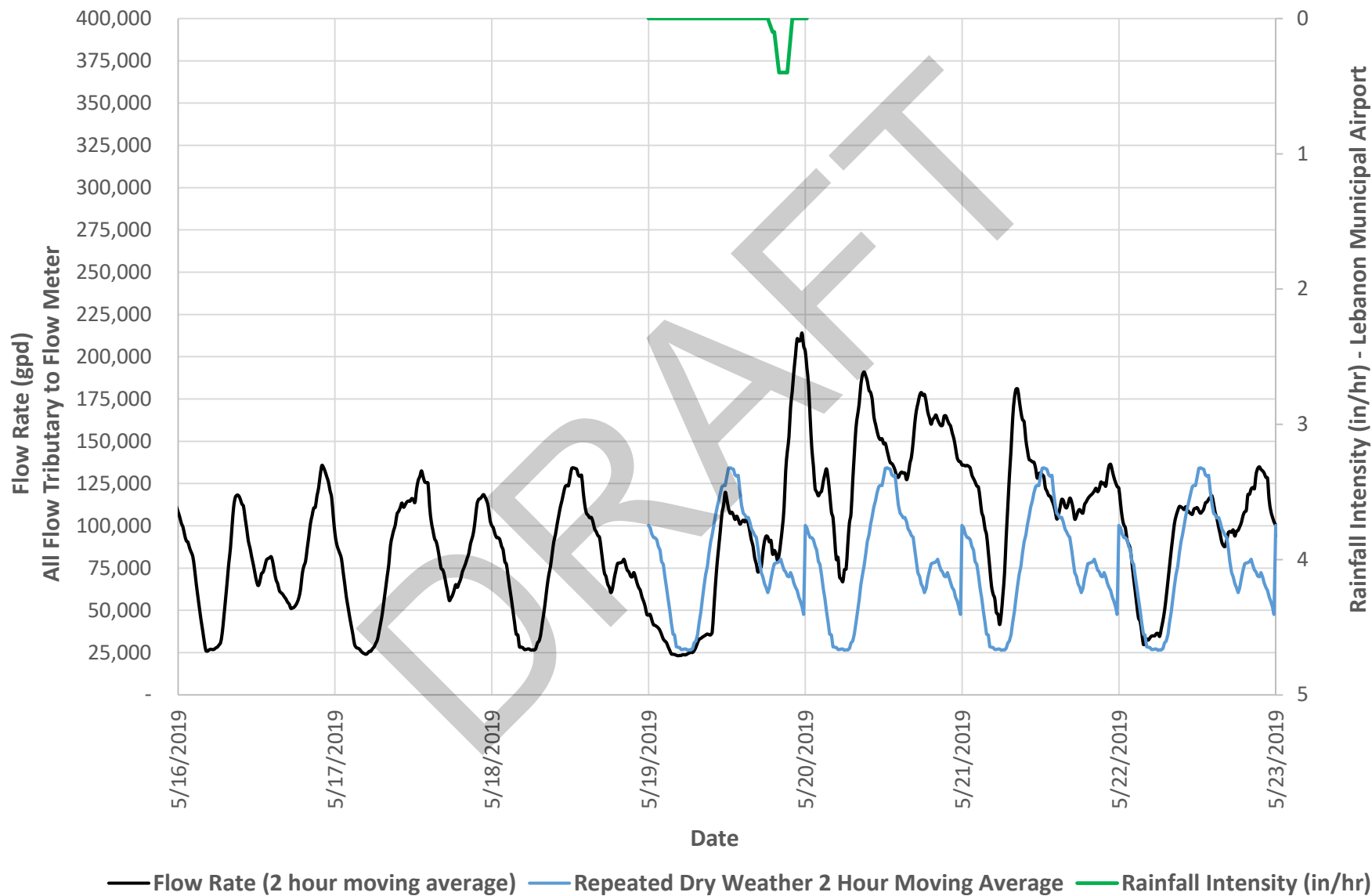


Figure 5J: Flow Meter #3 - Main Street (Enfield, NH)
Storm Event (6/5/2019)

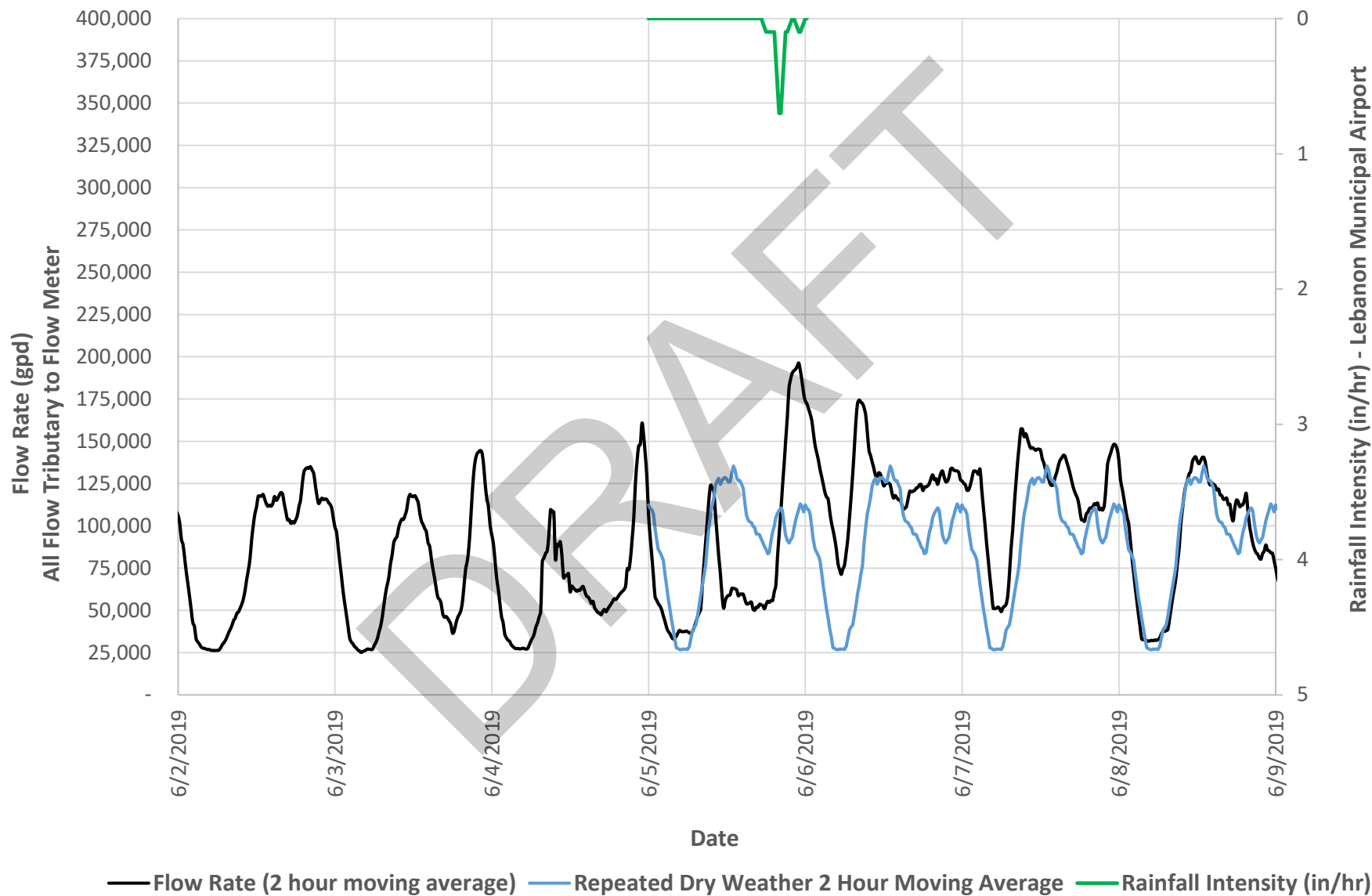


Figure 5K: Flow Meter #3 - Main Street (Enfield, NH)
Storm Event (6/20/2019)

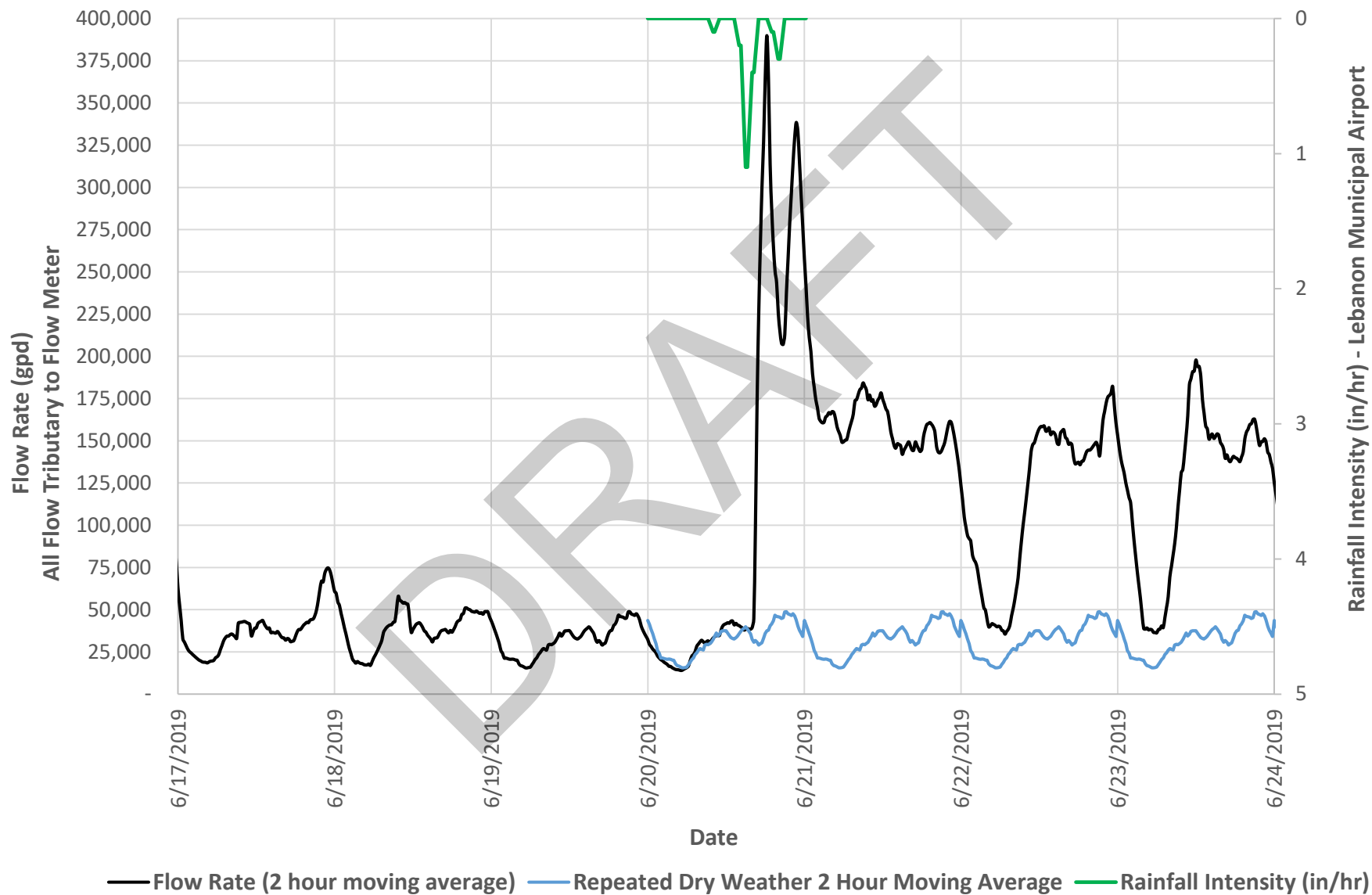


Figure 6A: Flow Meter #4 - Union Street (Enfield, NH)
Flow Rate vs Groundwater

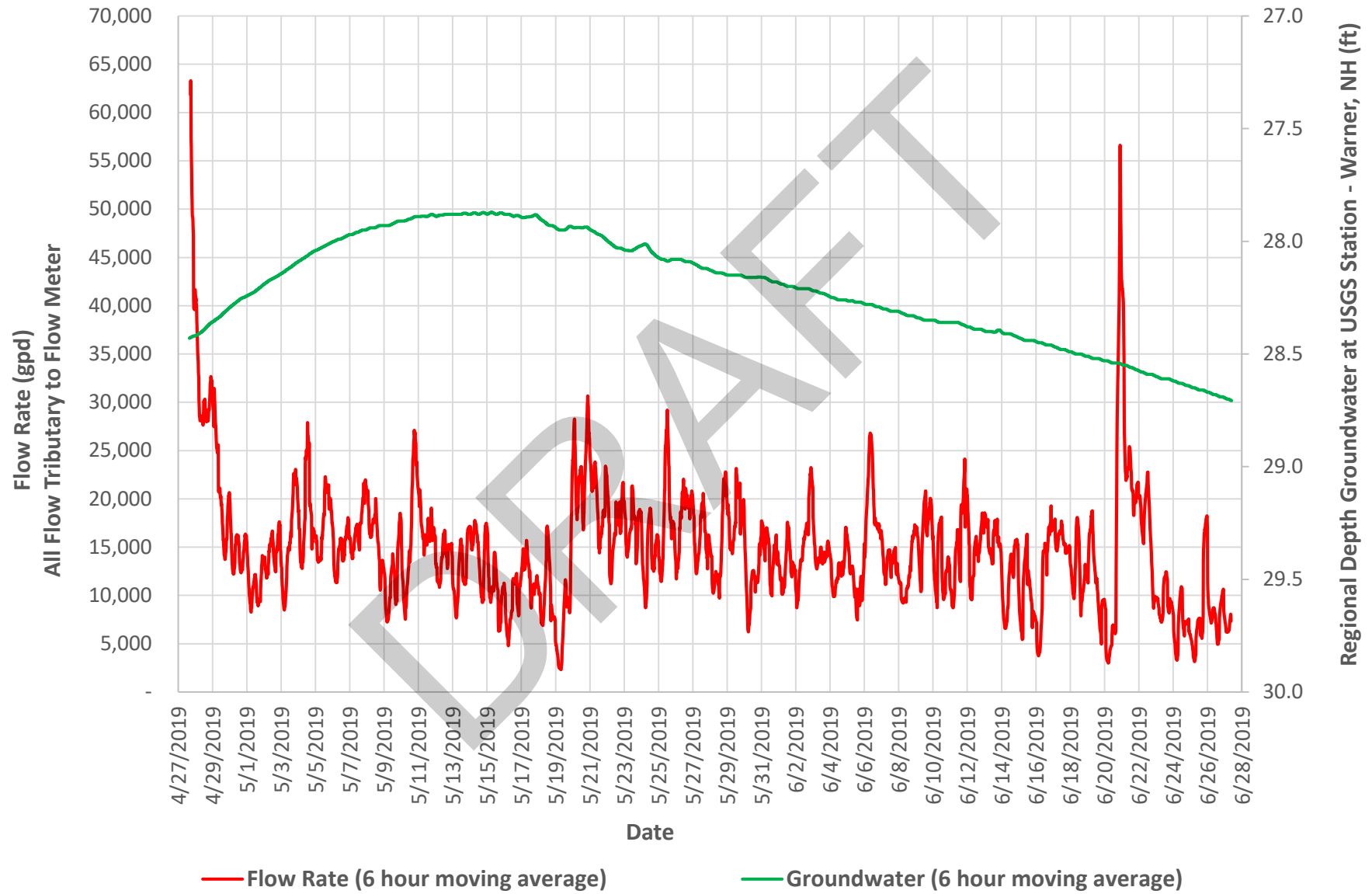


Figure 6B: Flow Meter #4 - Union Street (Enfield, NH)

Flow Rate vs Rainfall

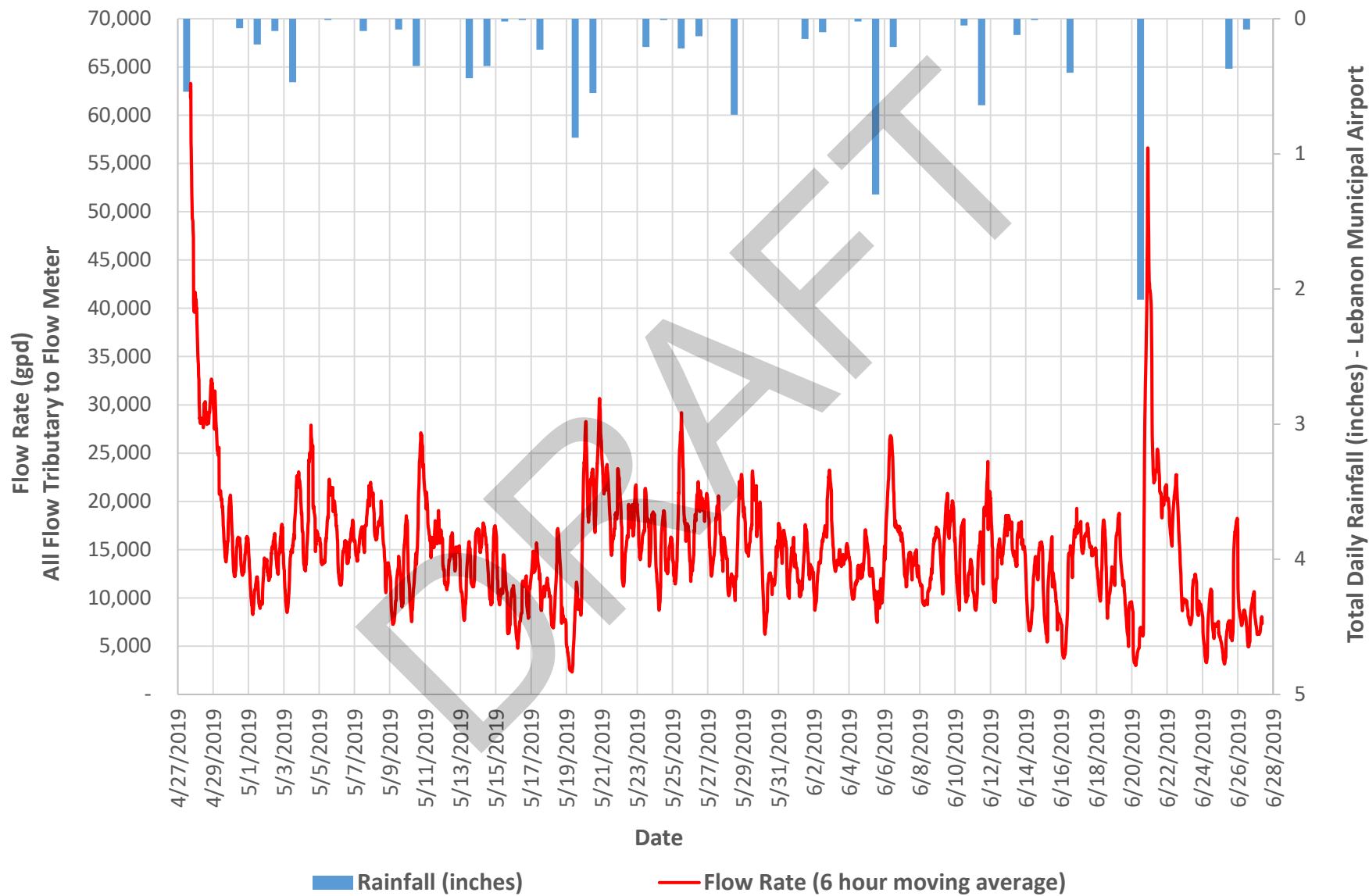


Figure 6C: Flow Meter #4 - Union Street (Enfield, NH)
Flow Rate vs Groundwater

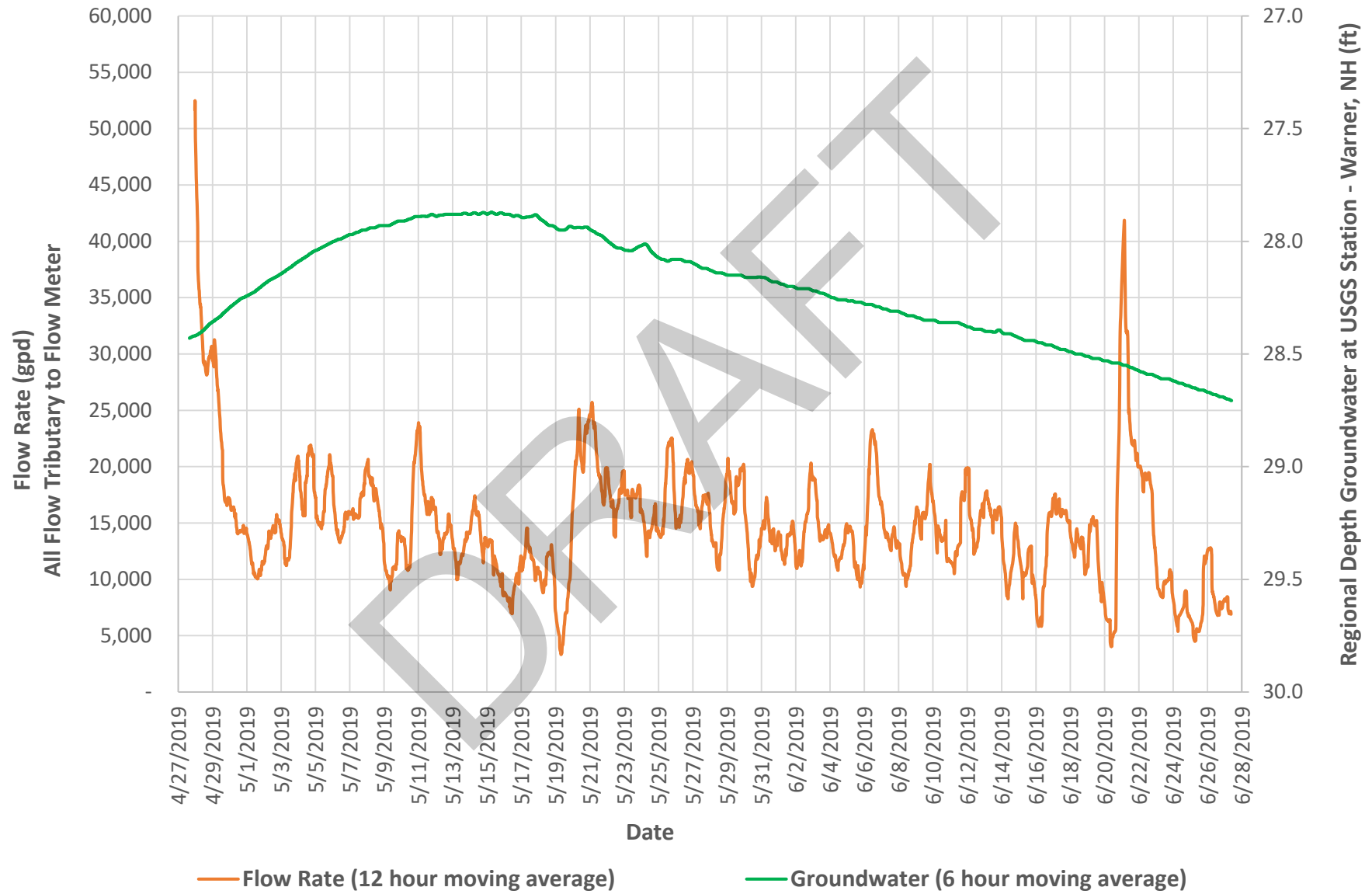


Figure 6D: Flow Meter #4 - Union Street (Enfield, NH)

Flow Rate vs Rainfall

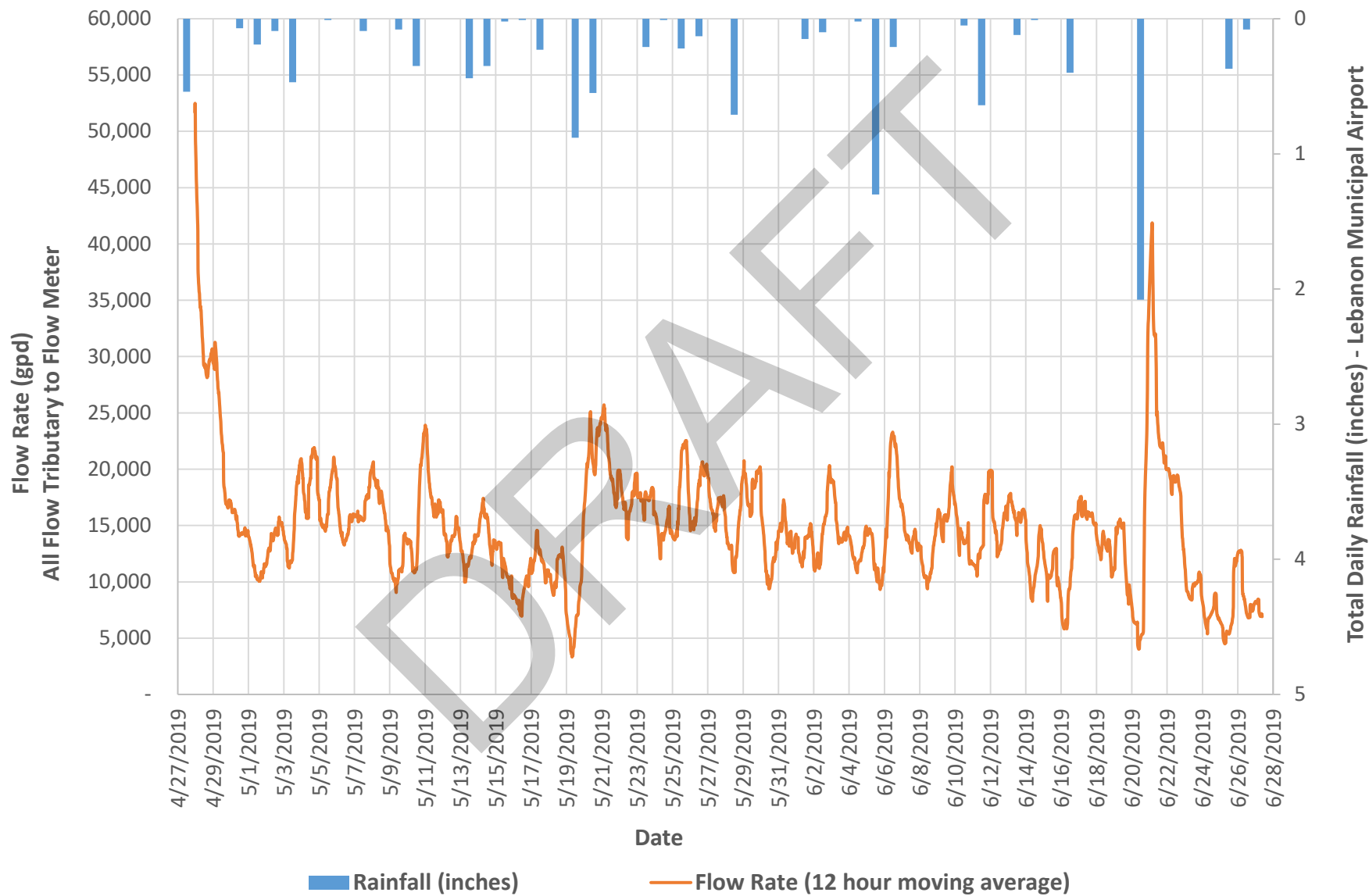


Figure 6E: Flow Meter #4 - Union Street (Enfield, NH)
Flow Rate vs Groundwater

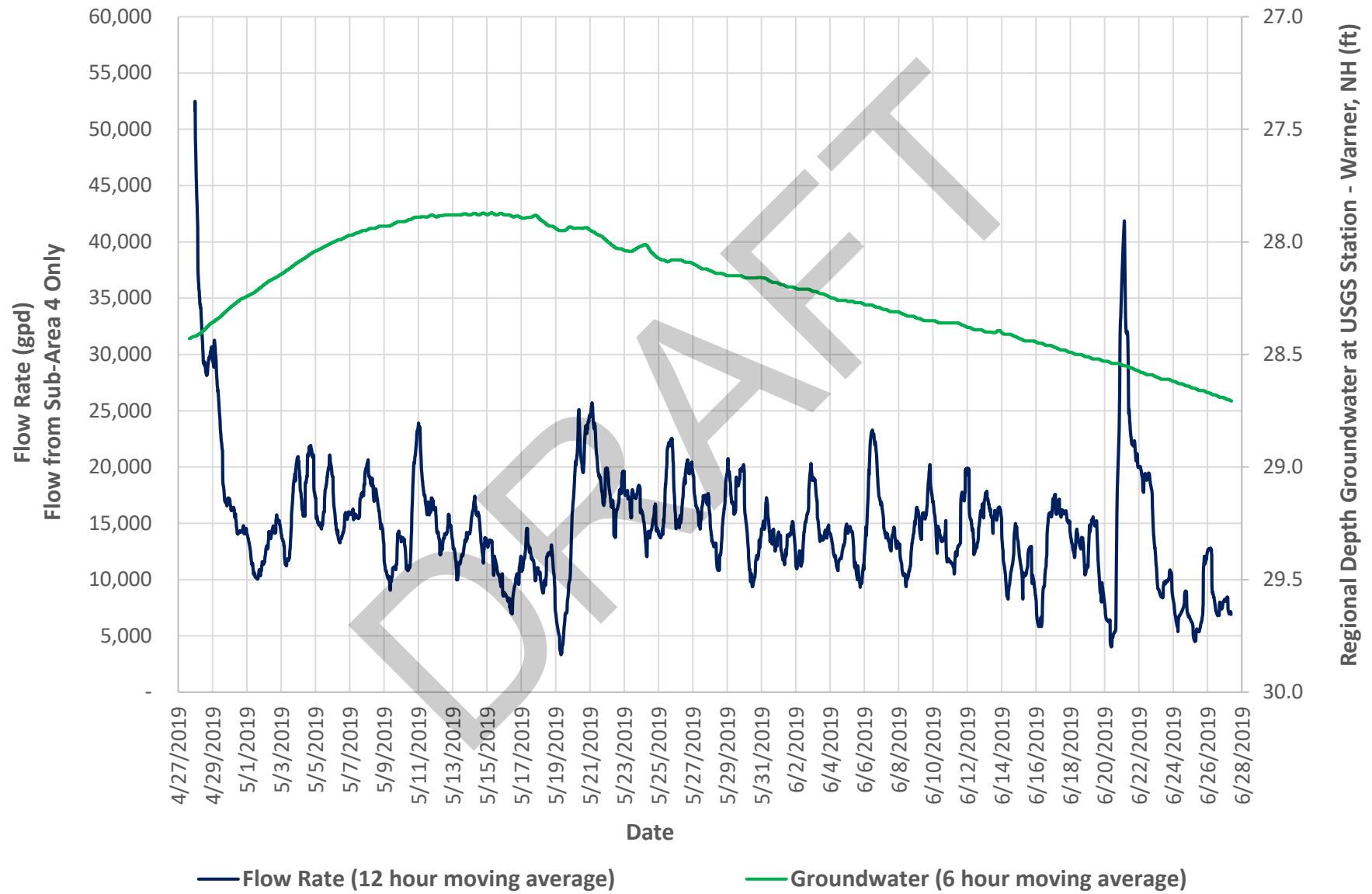


Figure 6F: Flow Meter #4 - Union Street (Enfield, NH)

Flow Rate vs Rainfall

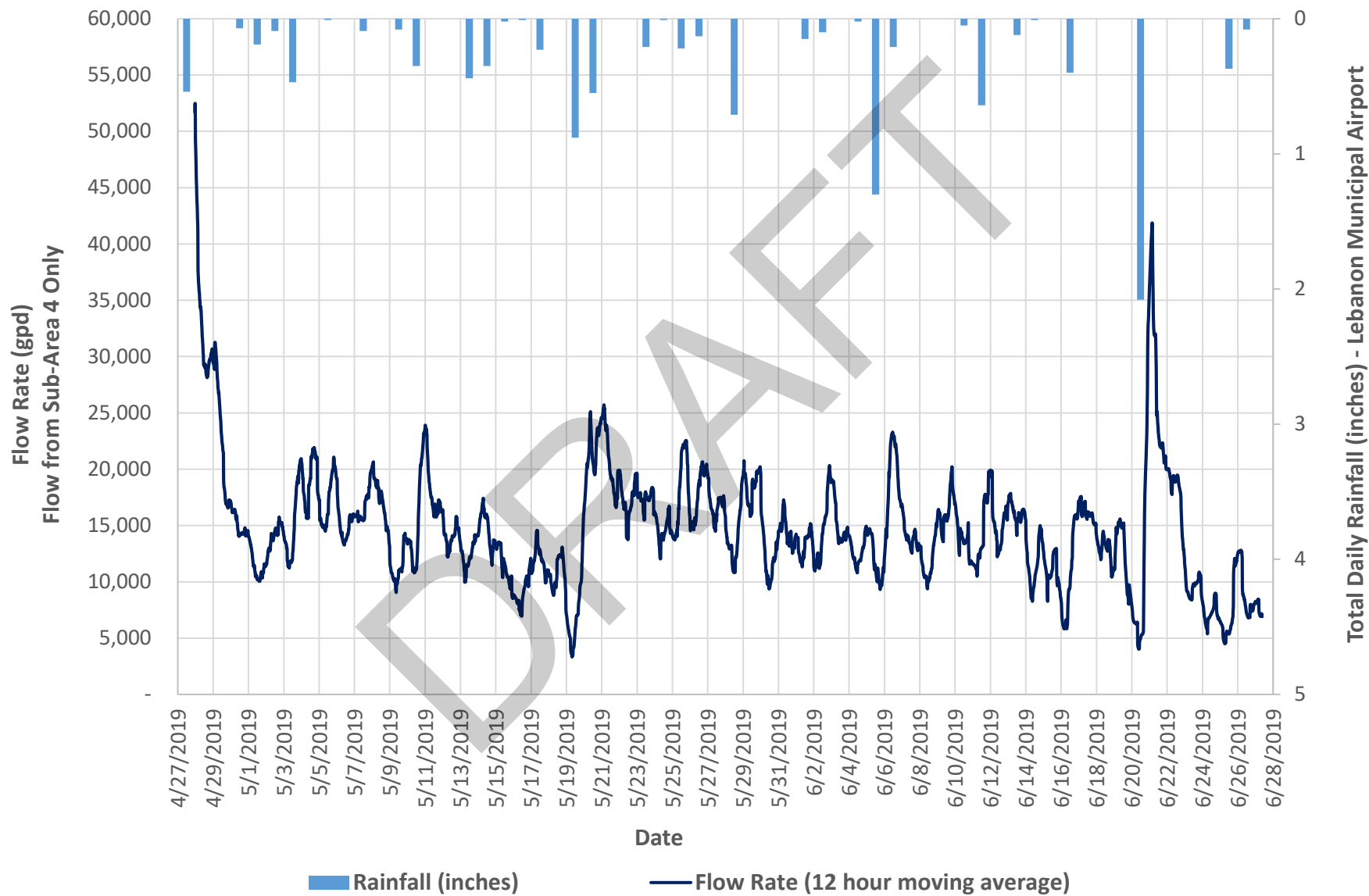


Figure 7G: Flow Meter #4 - Union Street (Enfield, NH)
Unit Flow Rate (gpd/idm) vs Groundwater

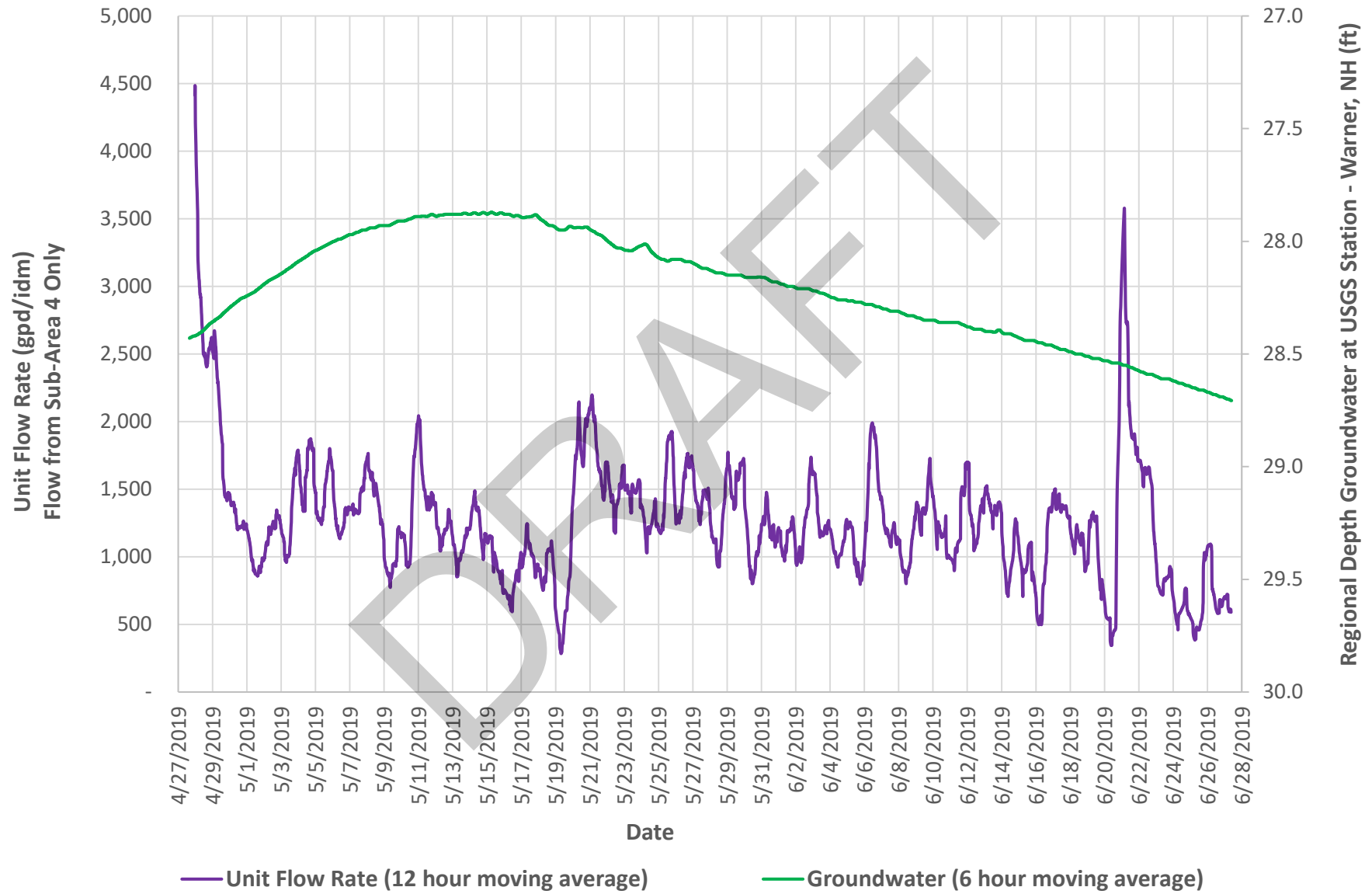


Figure 7H: Flow Meter #4 - Union Street (Enfield, NH)

Unit Flow Rate (gpd/idm) vs Rainfall

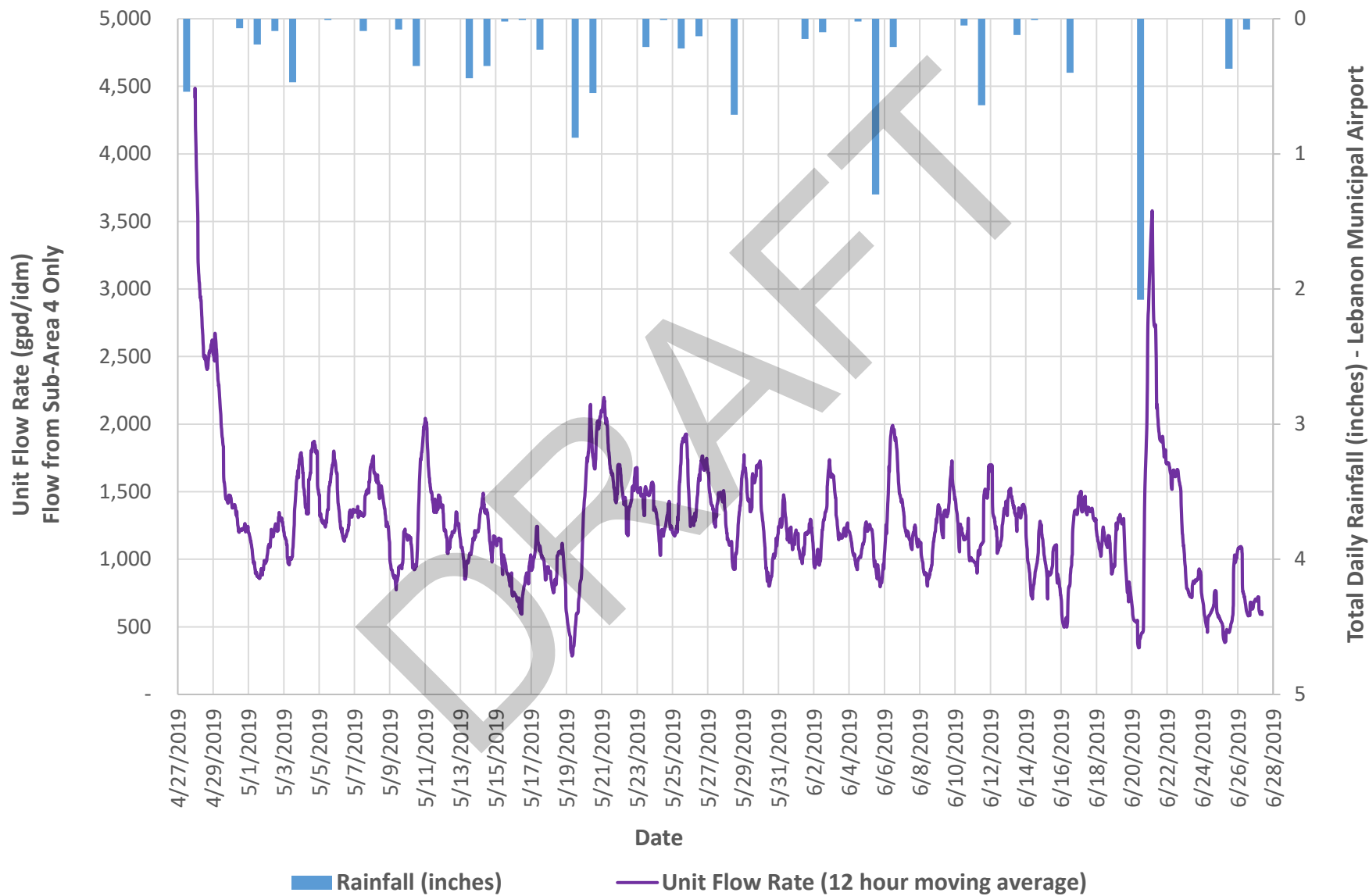


Figure 6I: Flow Meter #4 - Union Street (Enfield, NH)
Storm Event (5/19/2019)

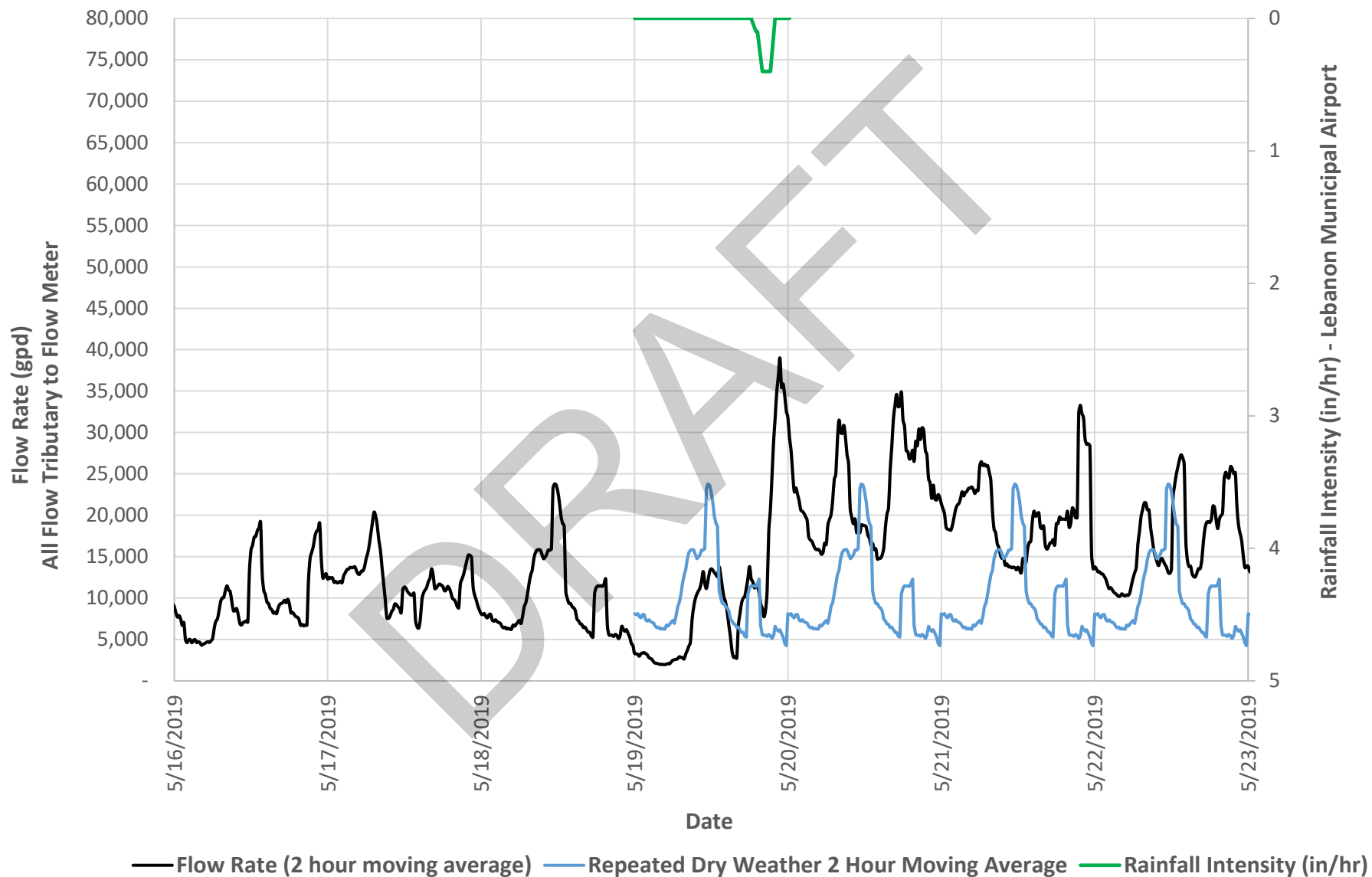


Figure 6J: Flow Meter #4 - Union Street (Enfield, NH)
Storm Event (6/5/2019)

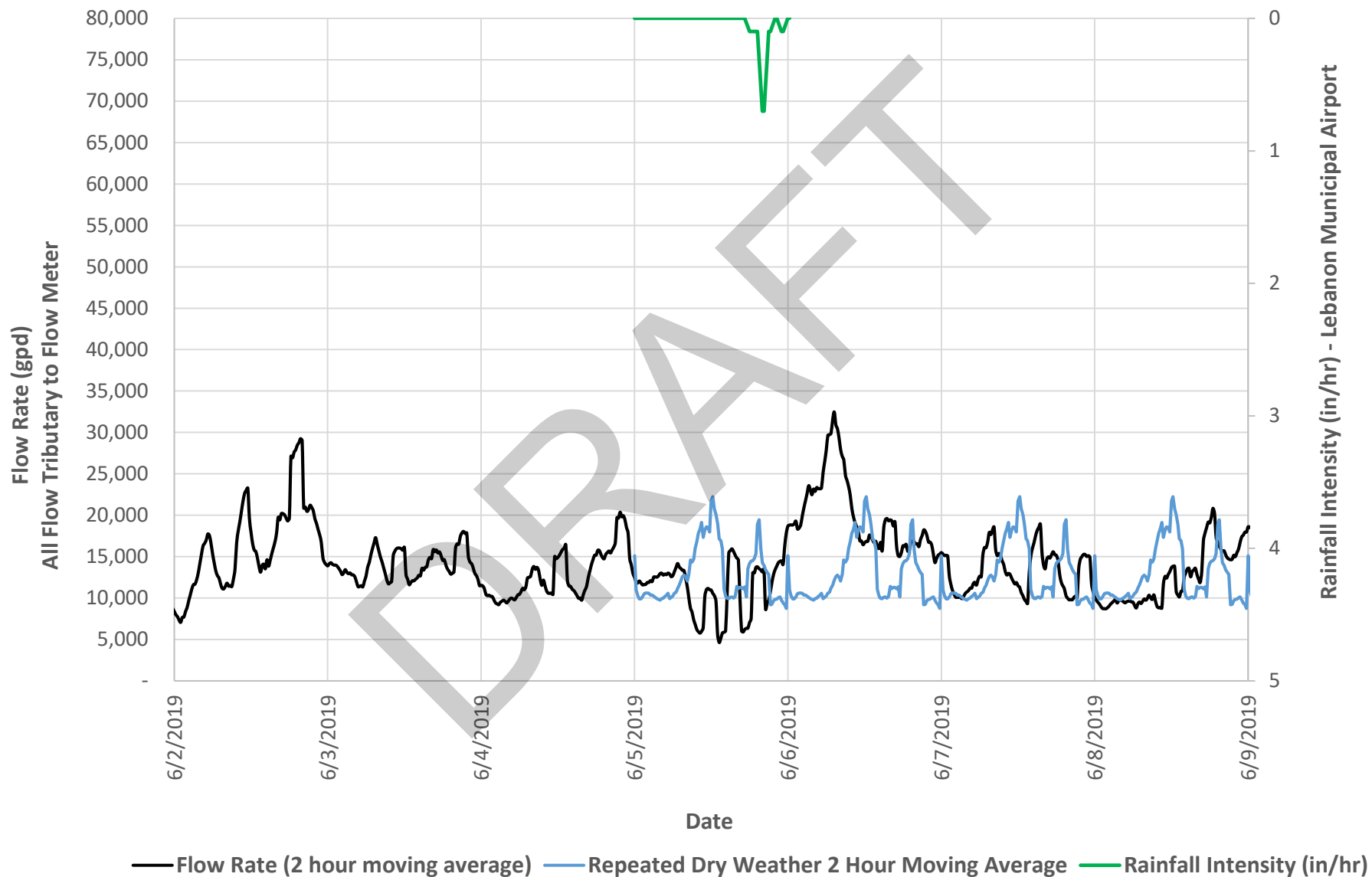


Figure 6K: Flow Meter #4 - Union Street (Enfield, NH)
Storm Event (6/20/2019)

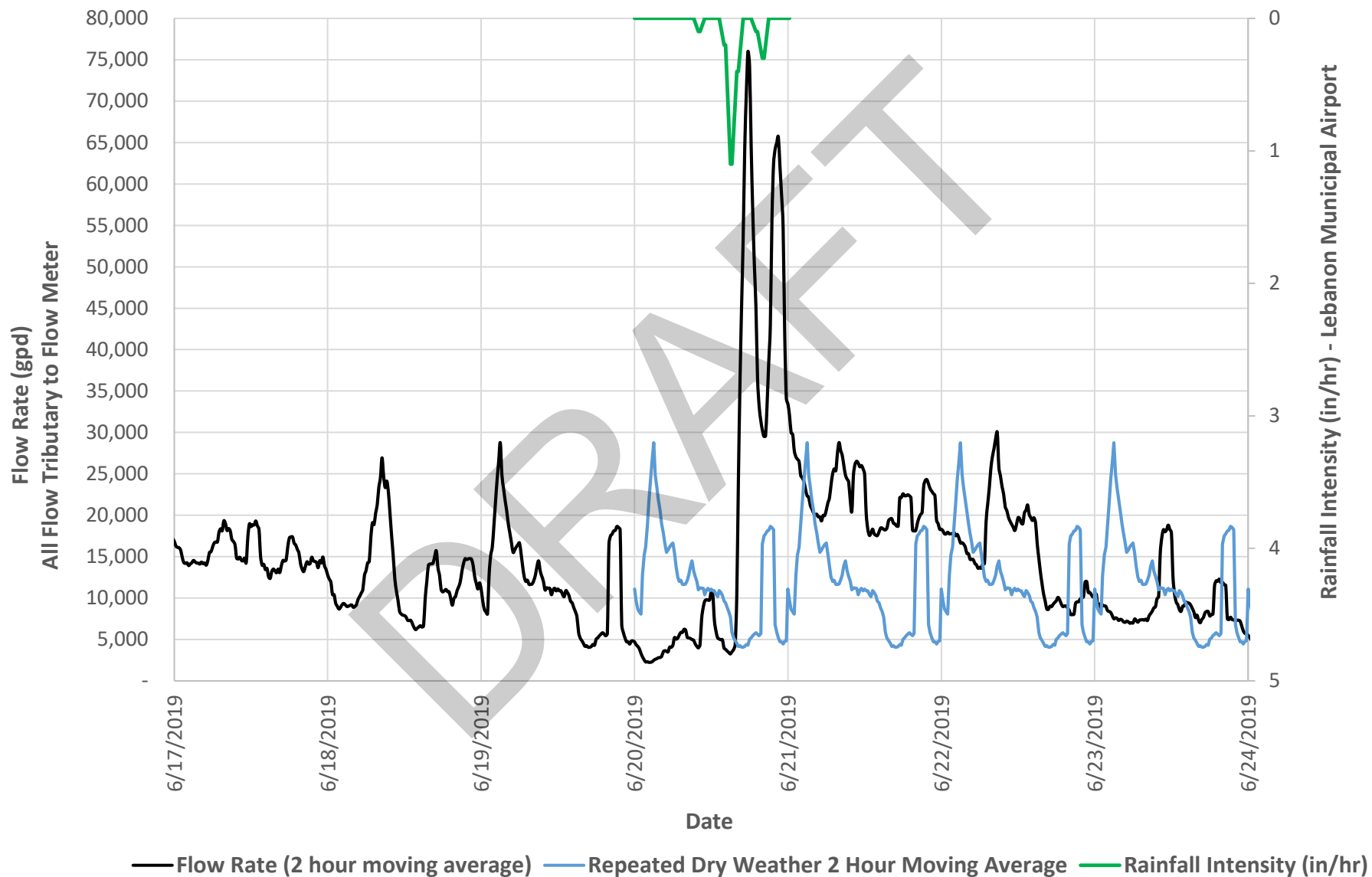


Figure 7A: Flow Meter #5 - Shaker Hill Road (Enfield, NH)
Flow Rate vs Groundwater

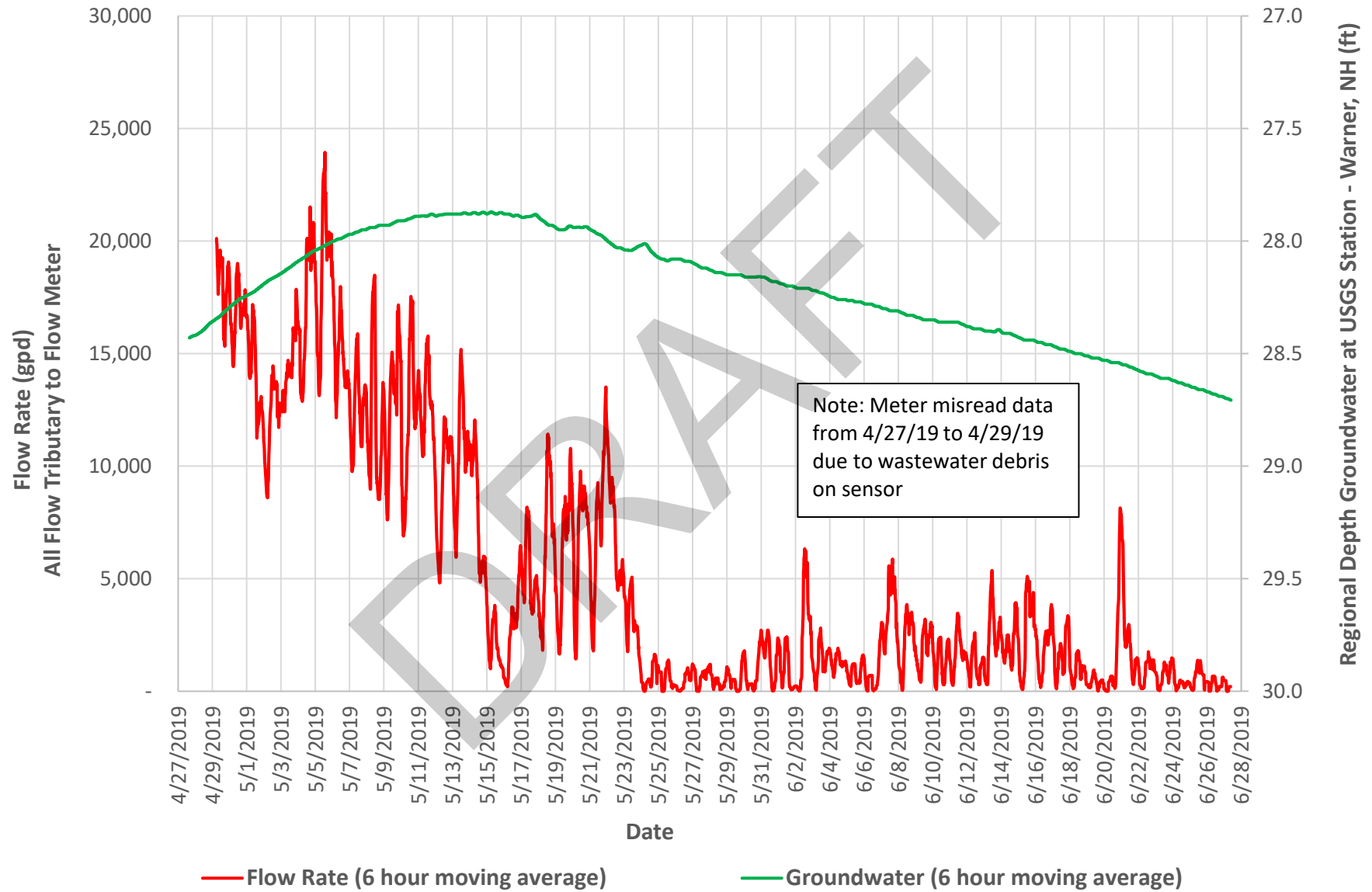


Figure 7B: Flow Meter #5 - Shaker Hill Road (Enfield, NH)

Flow Rate vs Rainfall

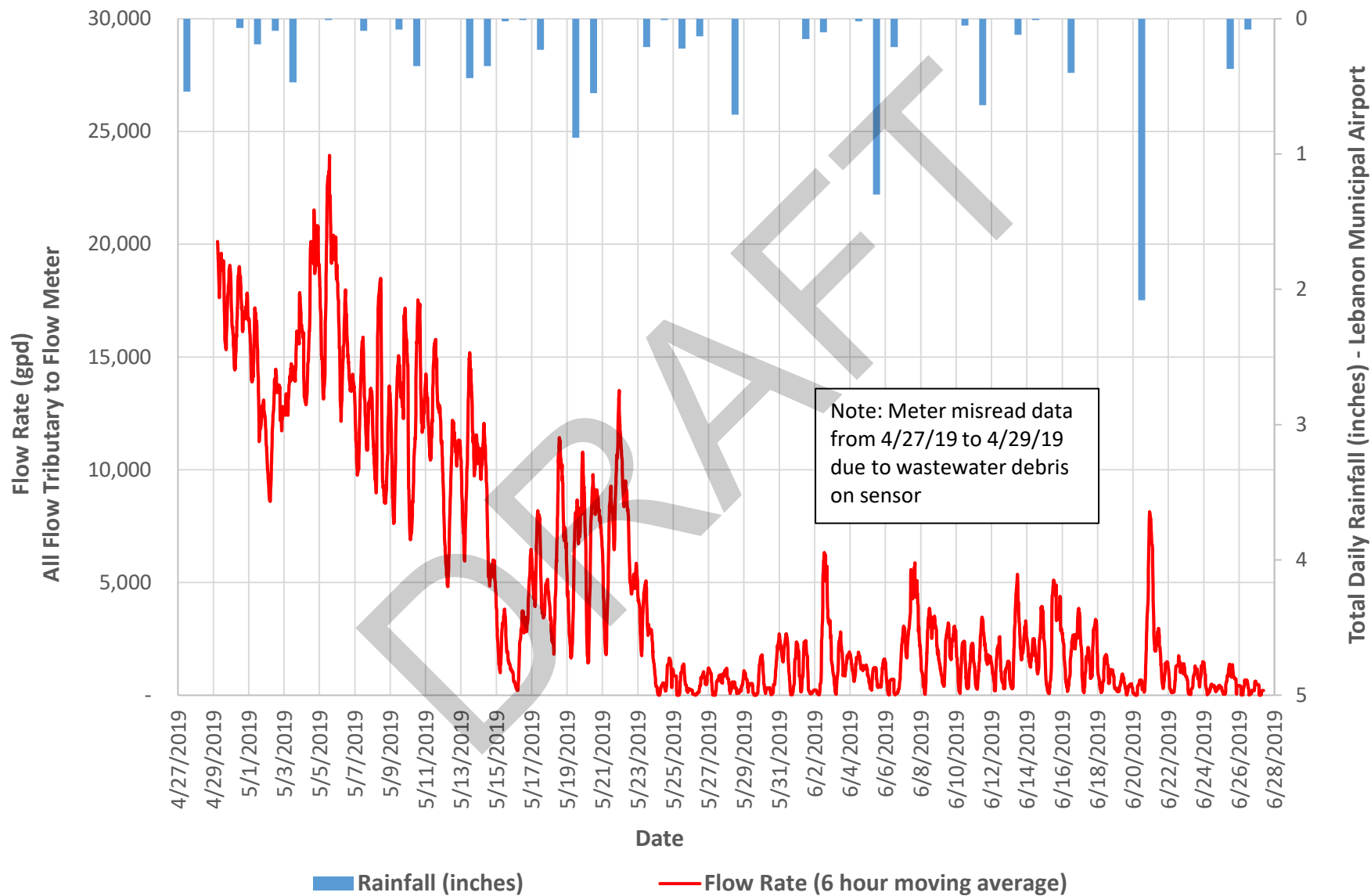


Figure 7C: Flow Meter #5 - Shaker Hill Road (Enfield, NH)
Flow Rate vs Groundwater

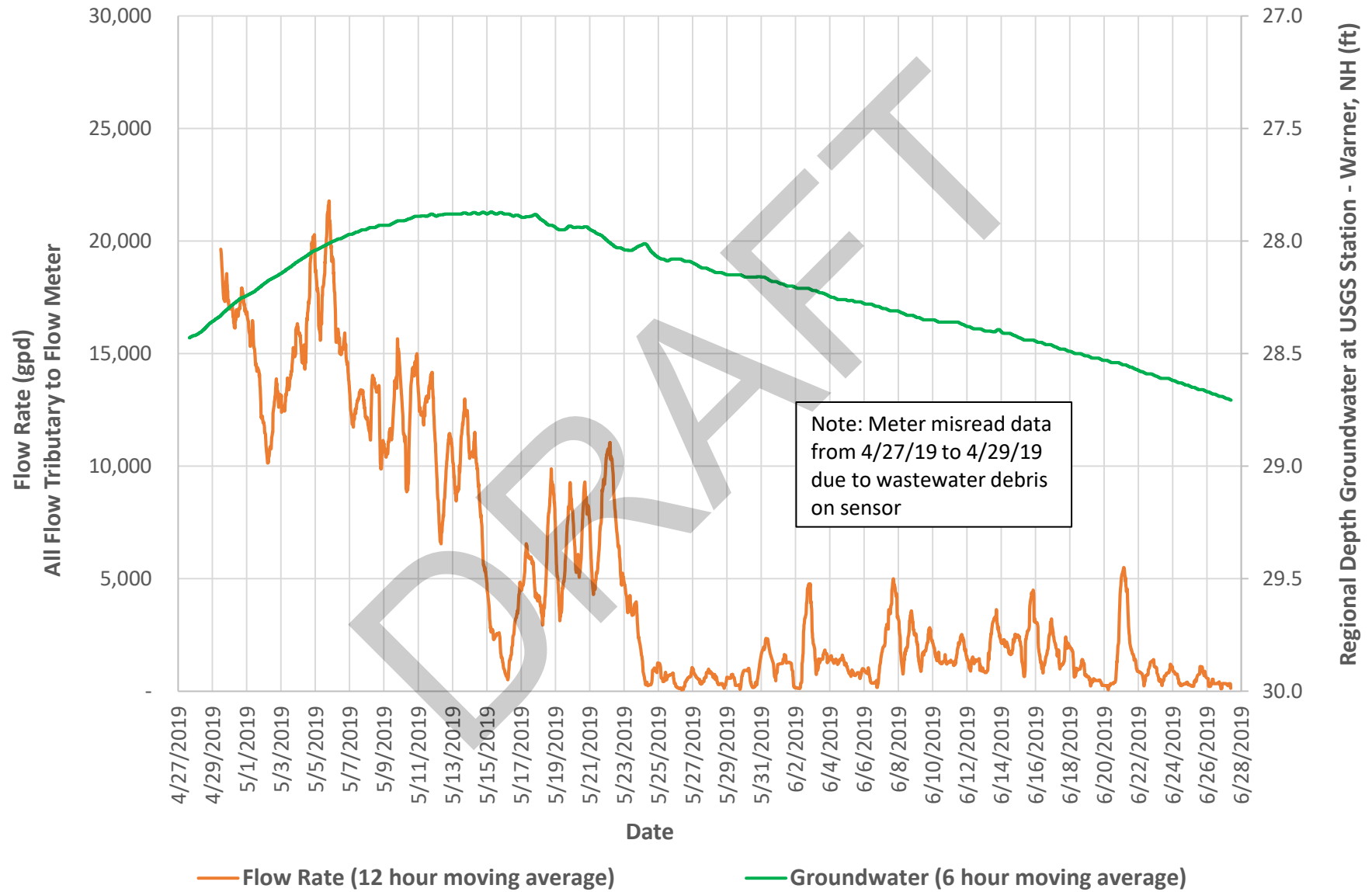


Figure 7D: Flow Meter #5 - Shaker Hill Road (Enfield, NH)

Flow Rate vs Rainfall

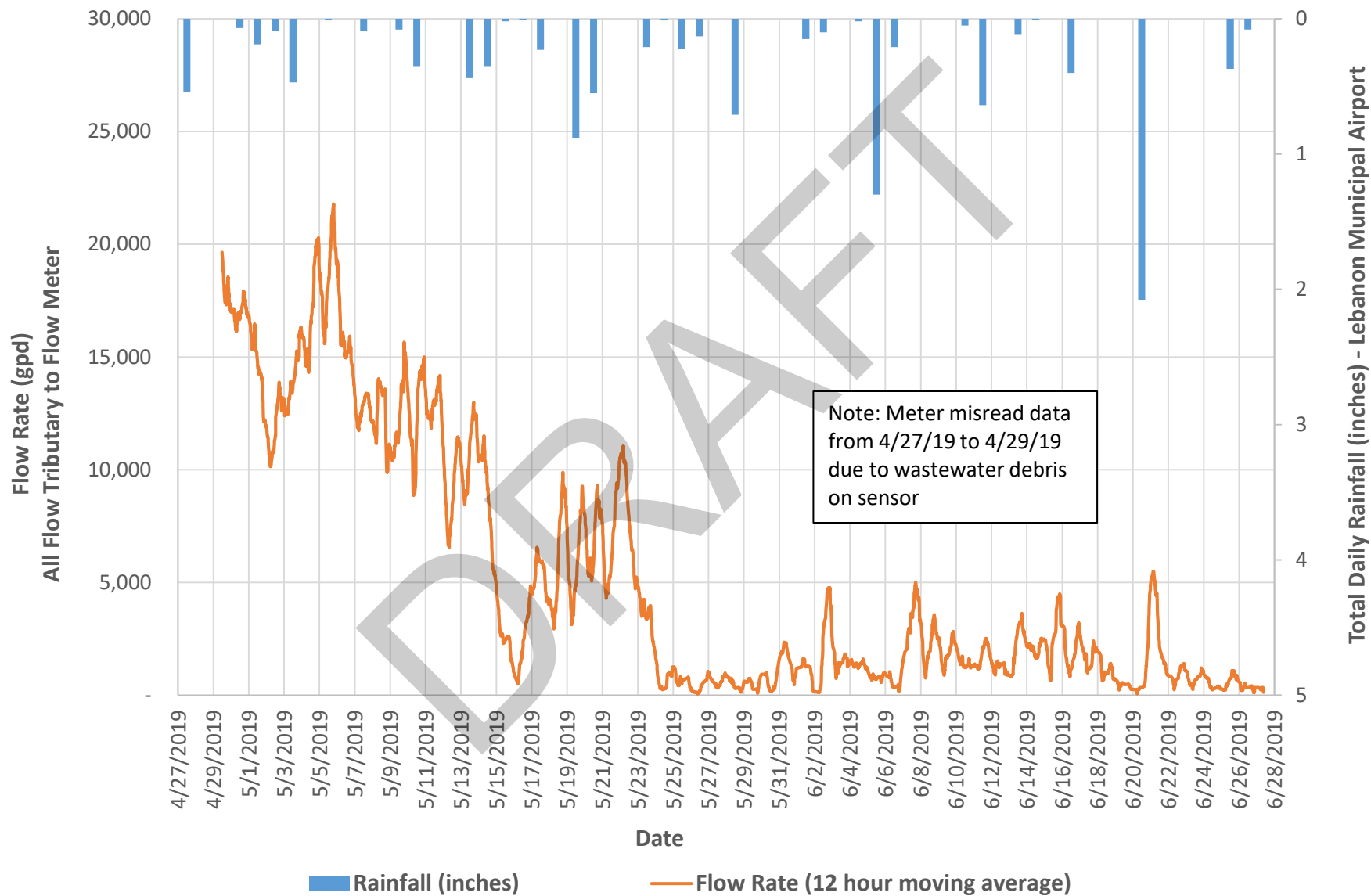


Figure 7E: Flow Meter #5 - Shaker Hill Road (Enfield, NH)
Flow Rate vs Groundwater

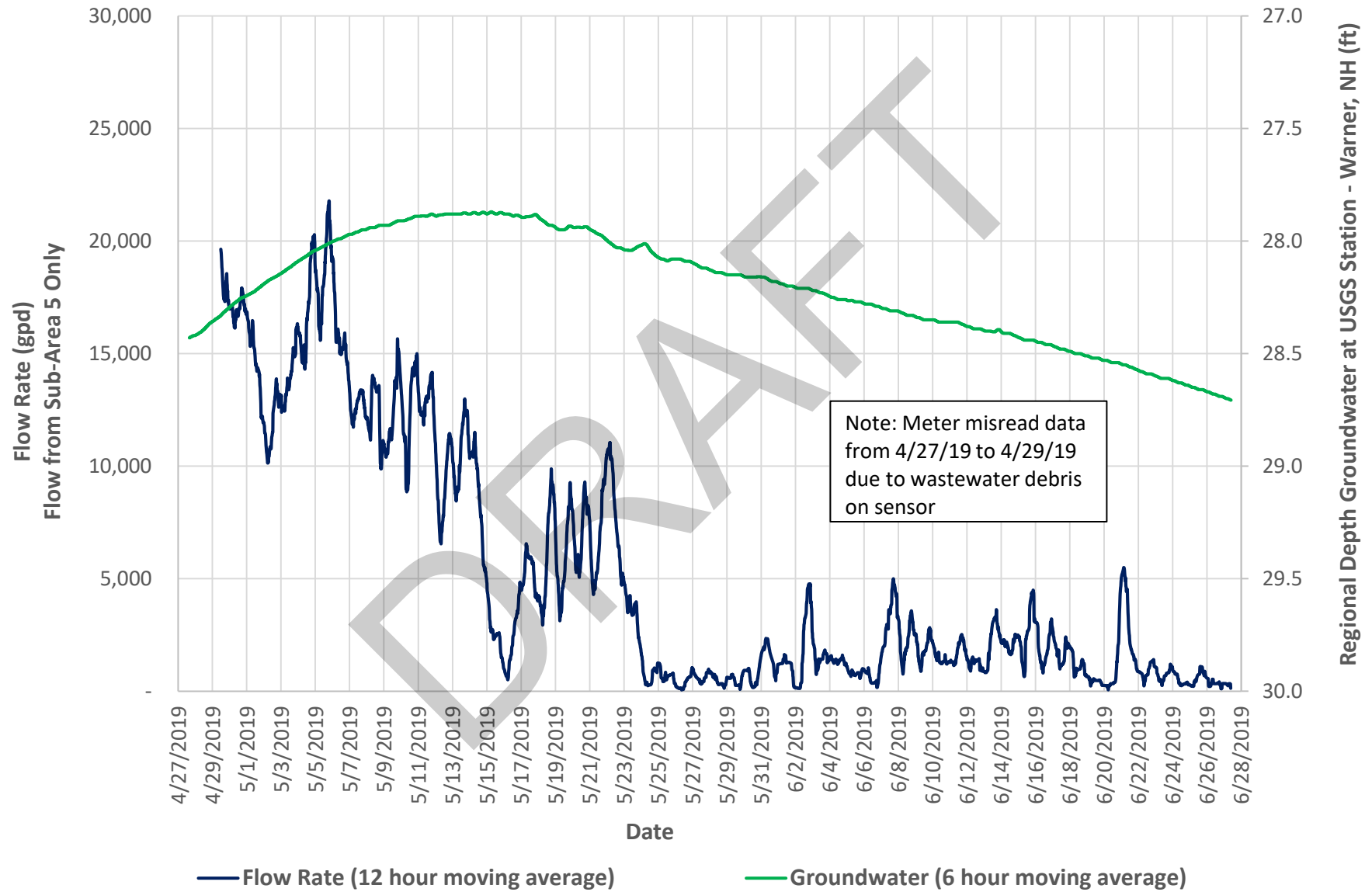


Figure 7F: Flow Meter #5 - Shaker Hill Road (Enfield, NH)

Flow Rate vs Rainfall

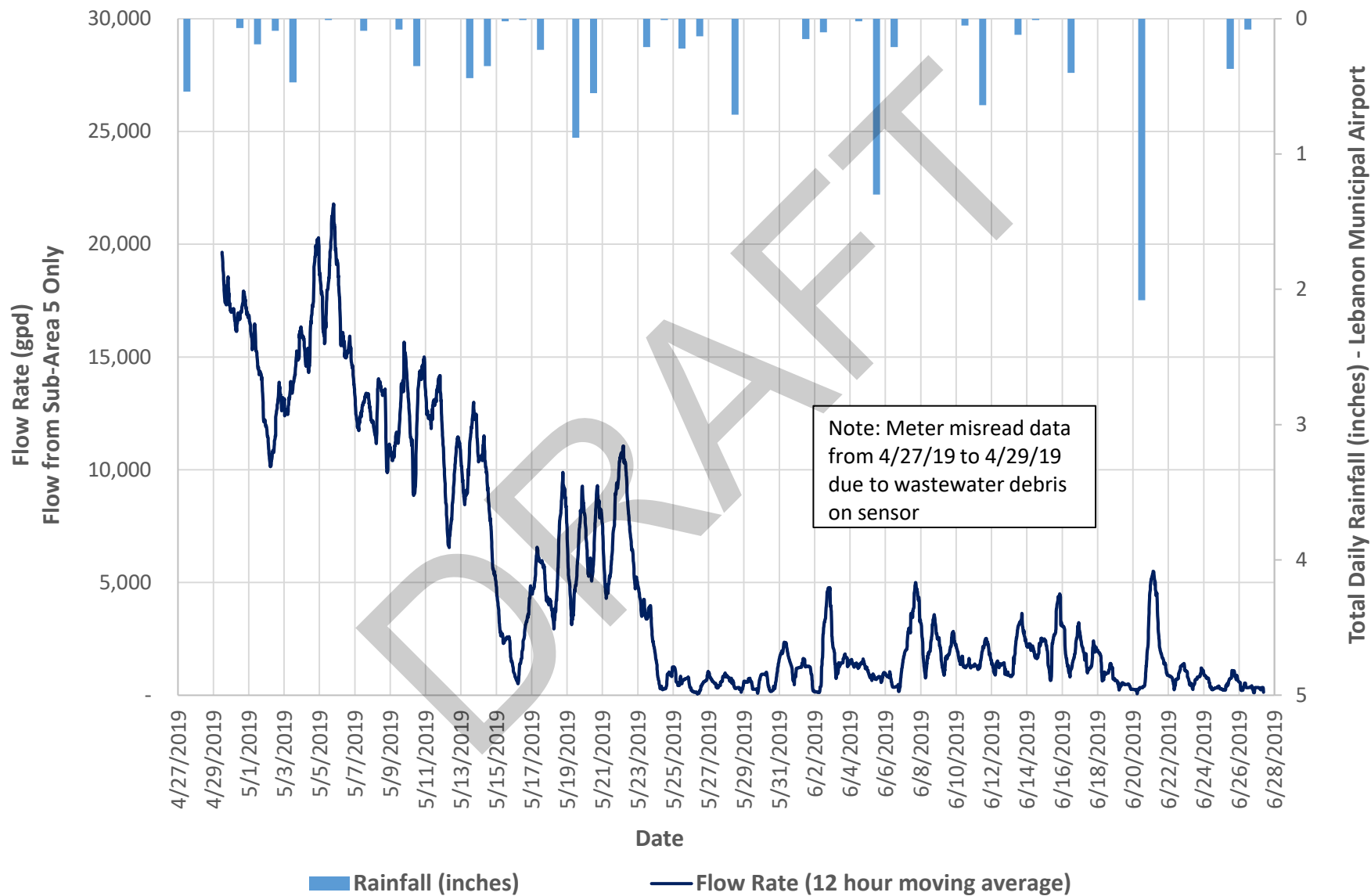


Figure 7G: Flow Meter #5 - Shaker Hill Road (Enfield, NH)
Unit Flow Rate (gpd/idm) vs Groundwater

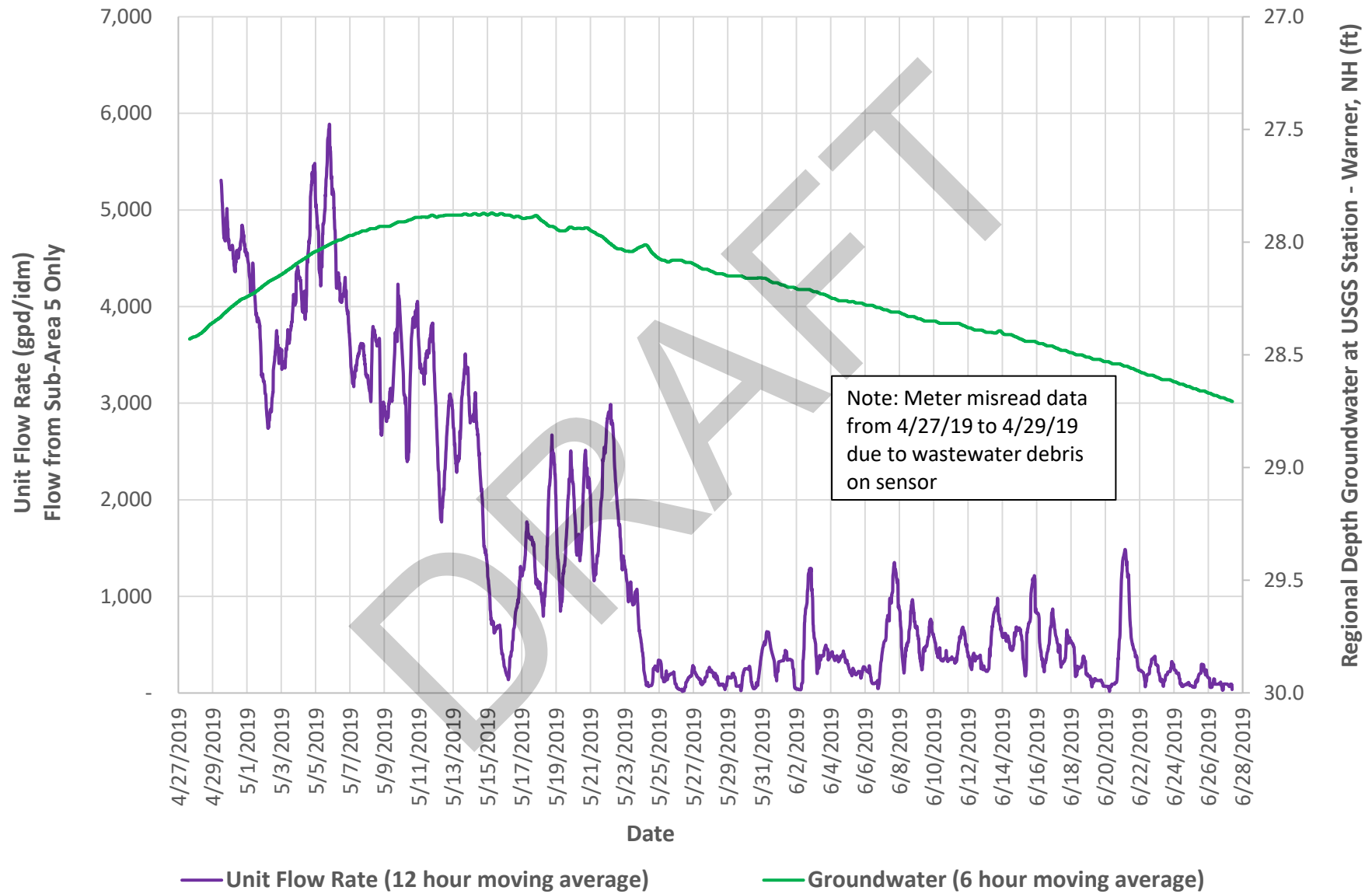


Figure 7H: Flow Meter #5 - Shaker Hill Road (Enfield, NH)

Unit Flow Rate (gpd/idm) vs Rainfall

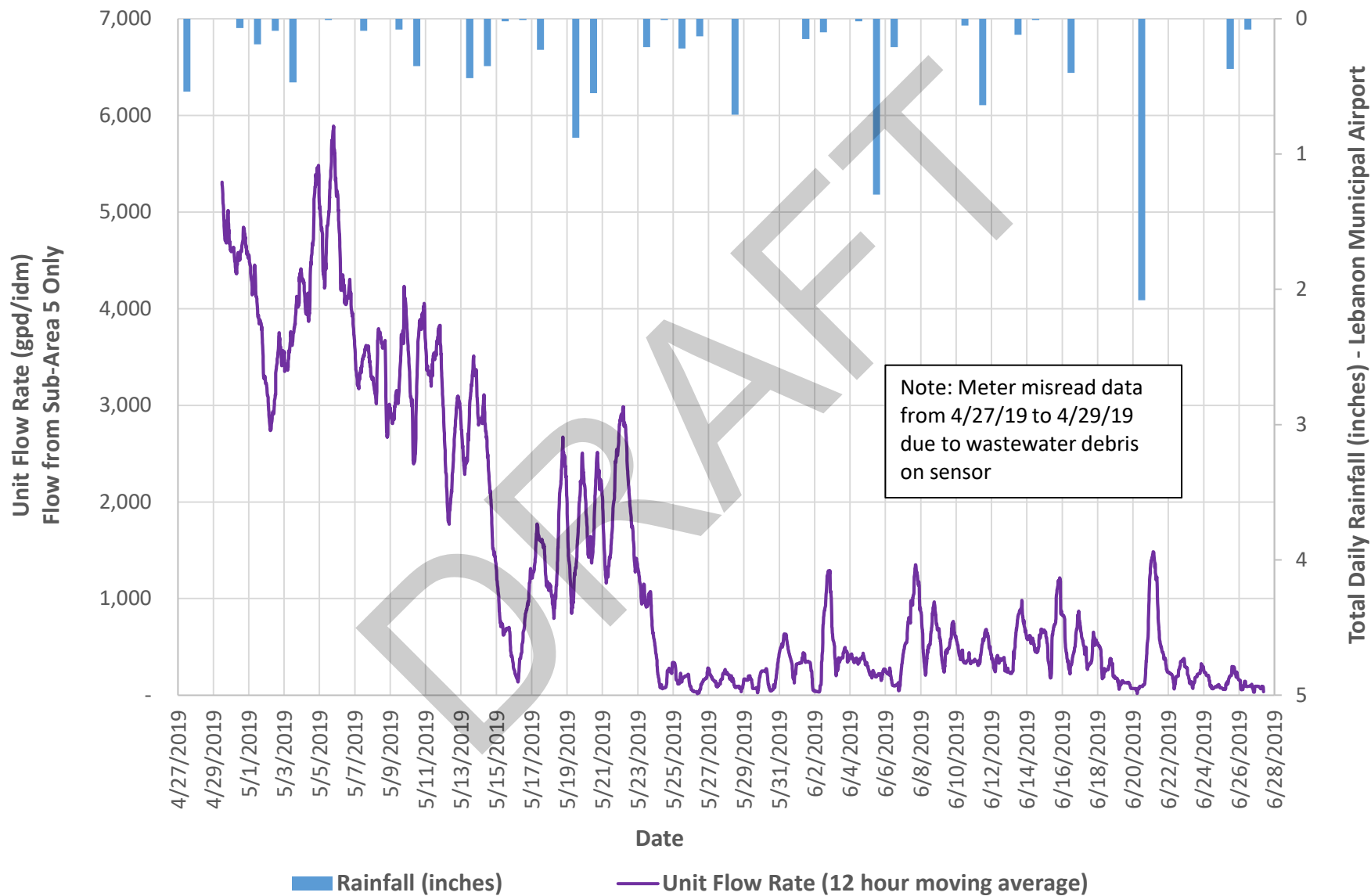


Figure 7I: Flow Meter #5 - Shaker Hill Road (Enfield, NH)
Storm Event (5/19/2019)

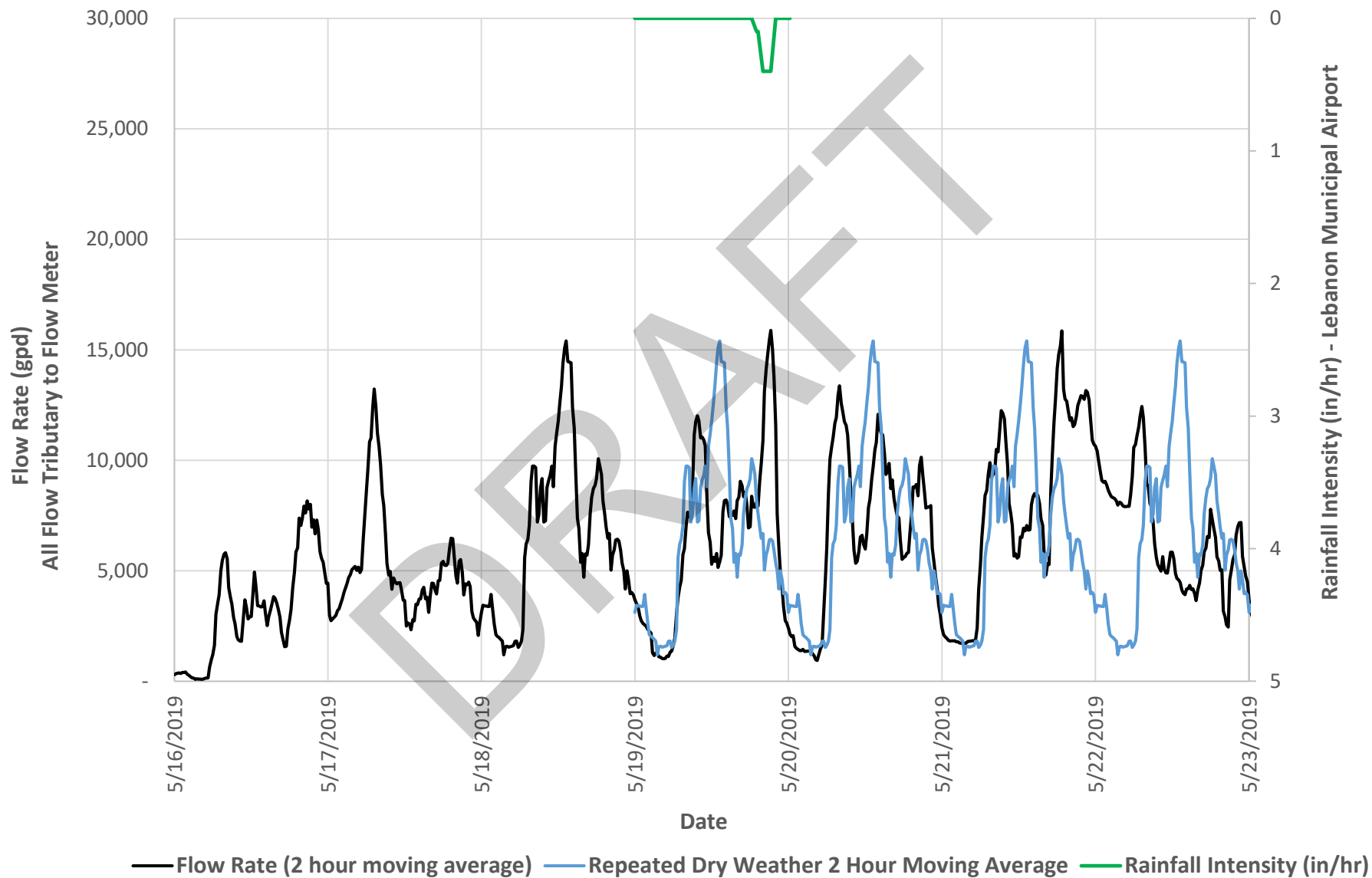


Figure 7J: Flow Meter #5 - Shaker Hill Road (Enfield, NH)
Storm Event (6/5/2019)

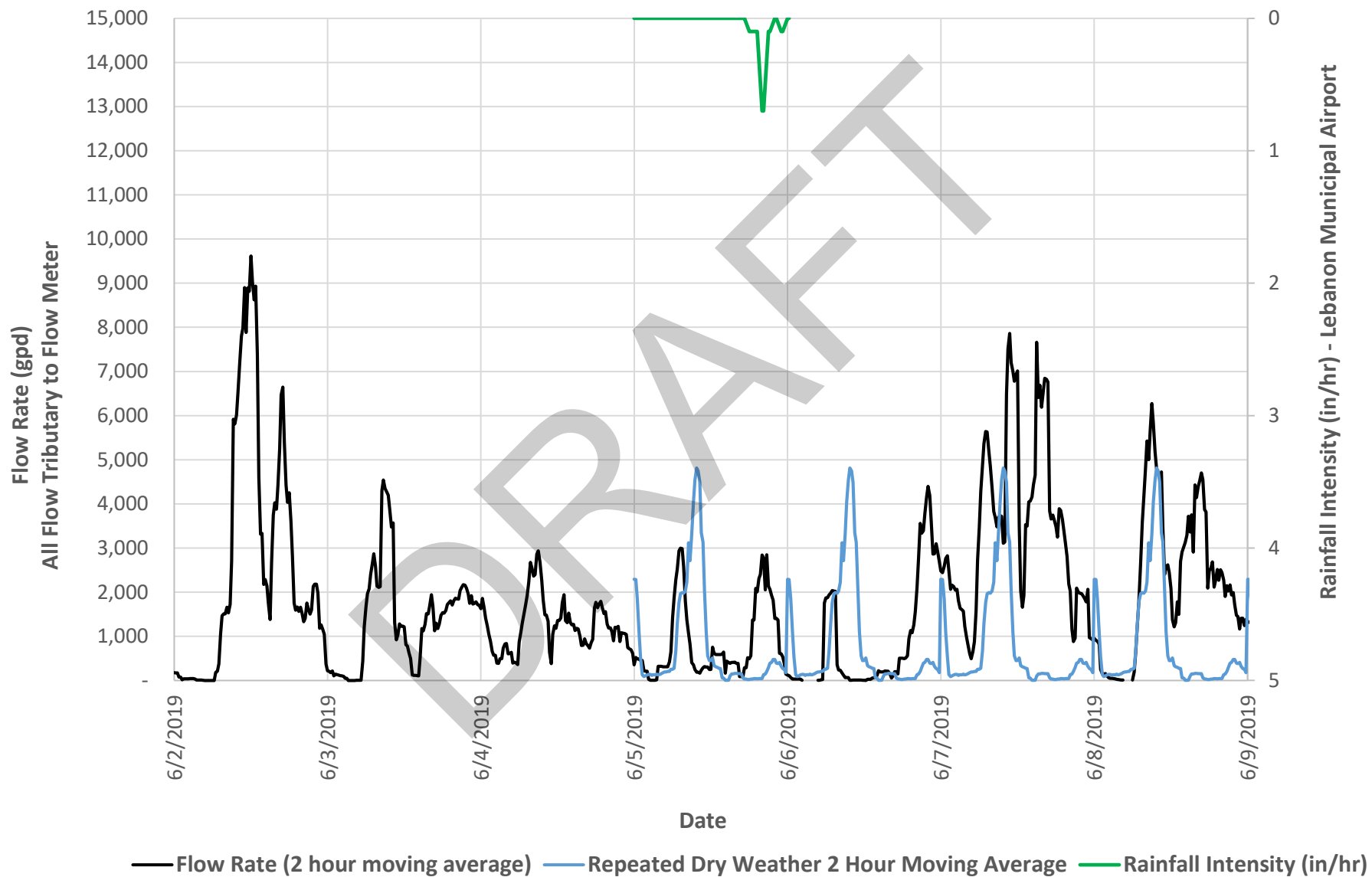


Figure 7K: Flow Meter #5 - Shaker Hill Road (Enfield, NH)
Storm Event (6/20/2019)

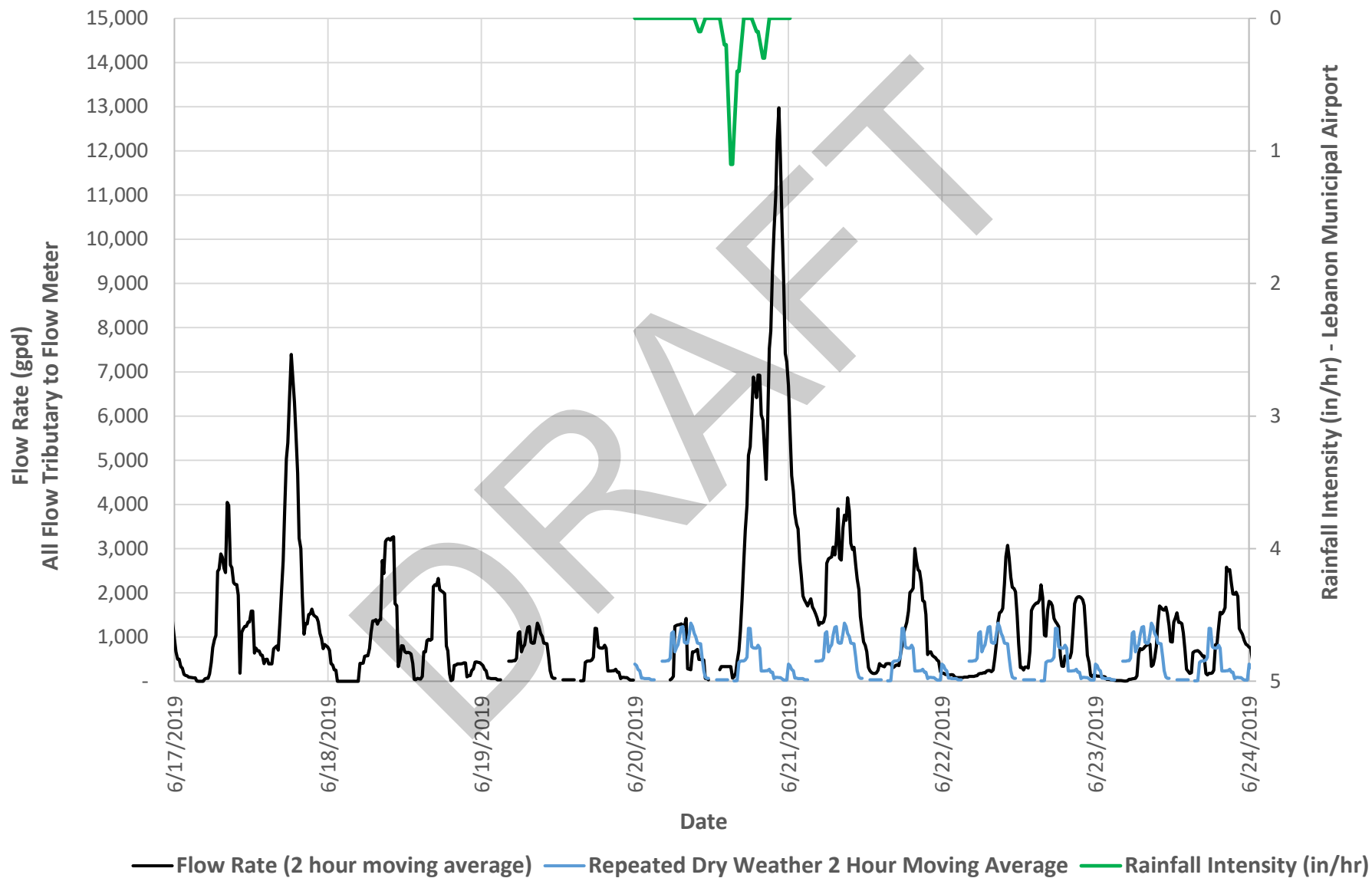


Figure 8A: Flow Meter #6 - Baltic Street (Enfield, NH)
Flow Rate vs Groundwater

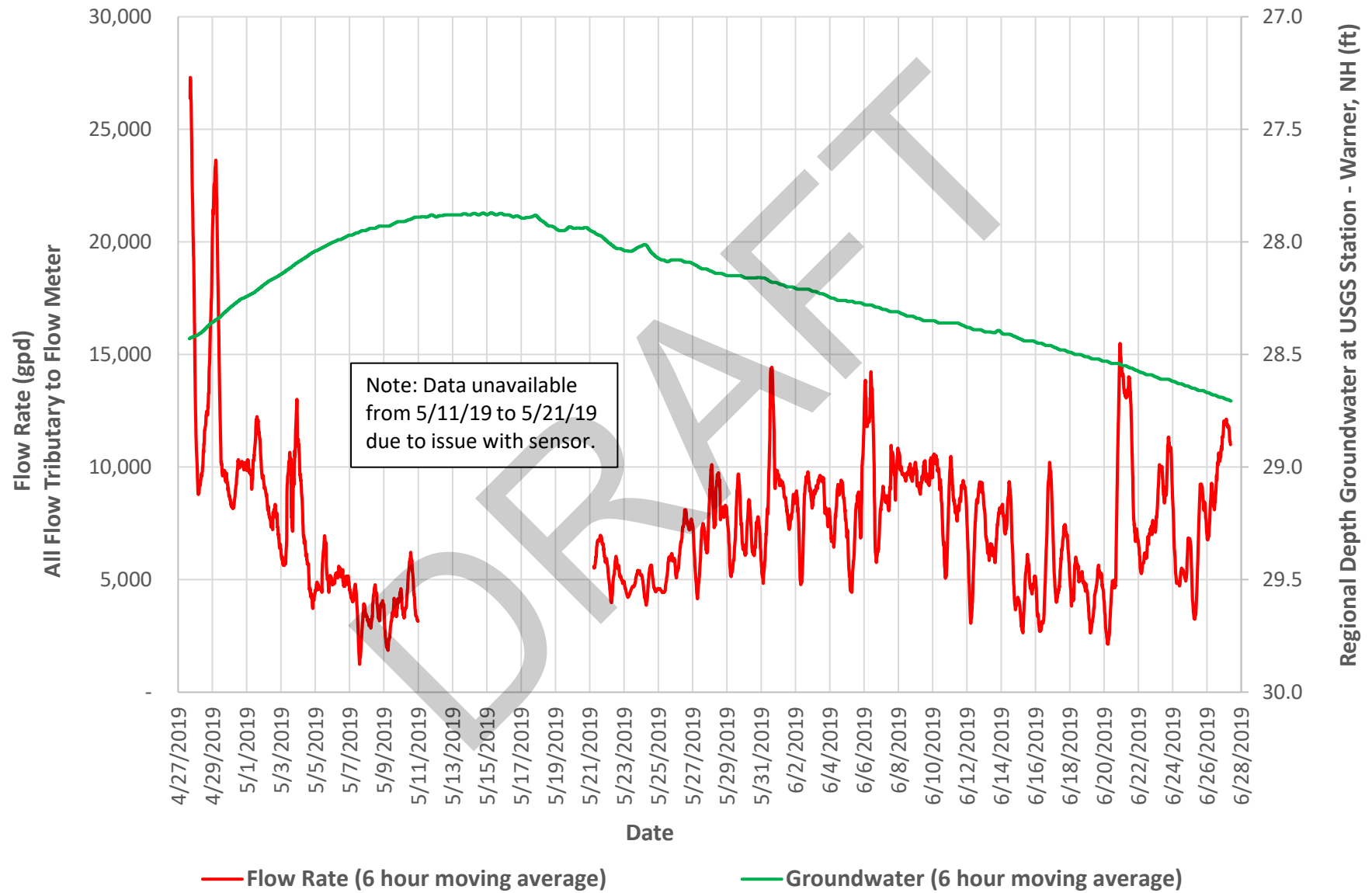


Figure 8B: Flow Meter #6 - Baltic Street (Enfield, NH)

Flow Rate vs Rainfall

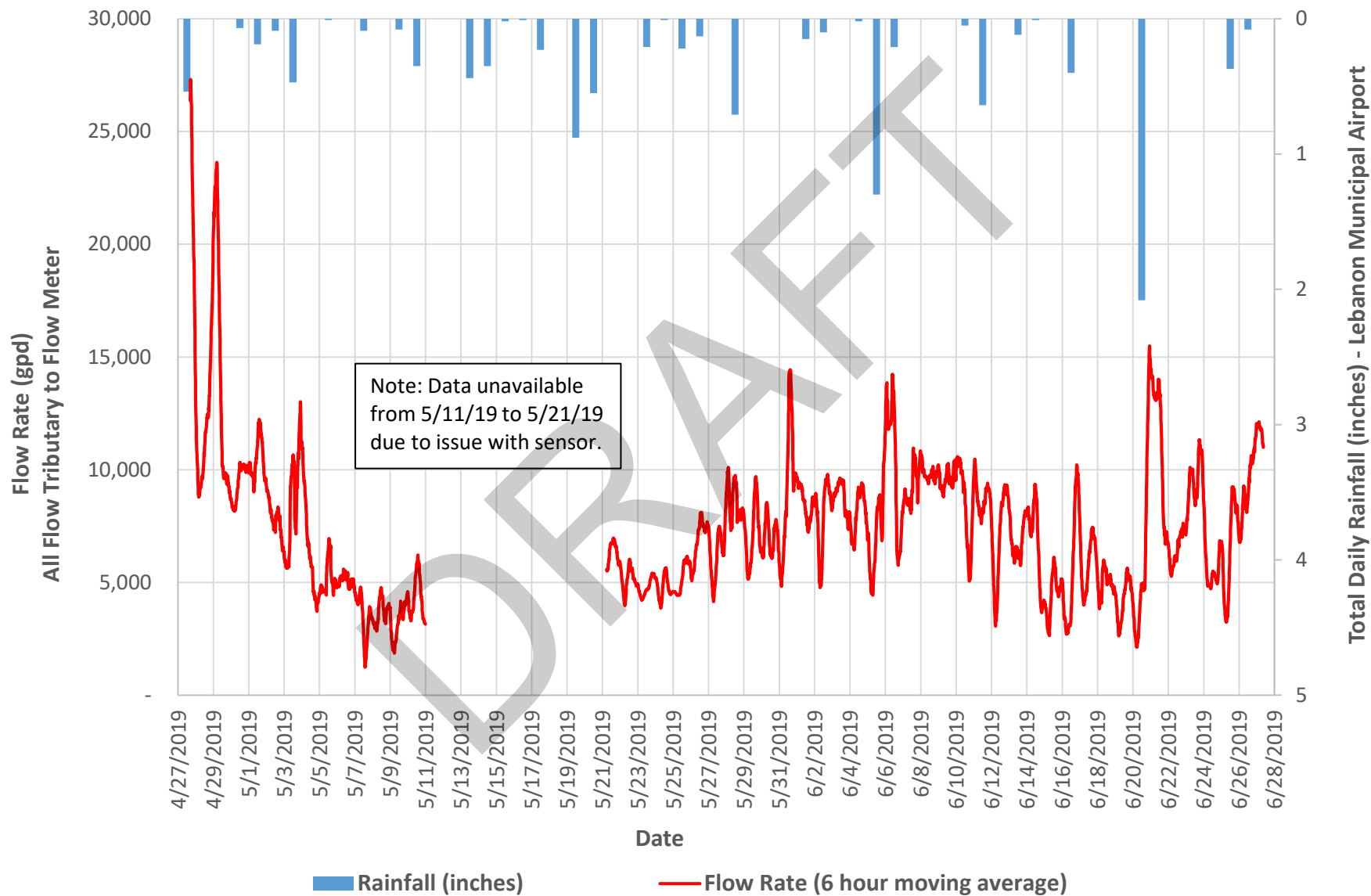


Figure 8C: Flow Meter #6 - Baltic Street (Enfield, NH)
Flow Rate vs Groundwater

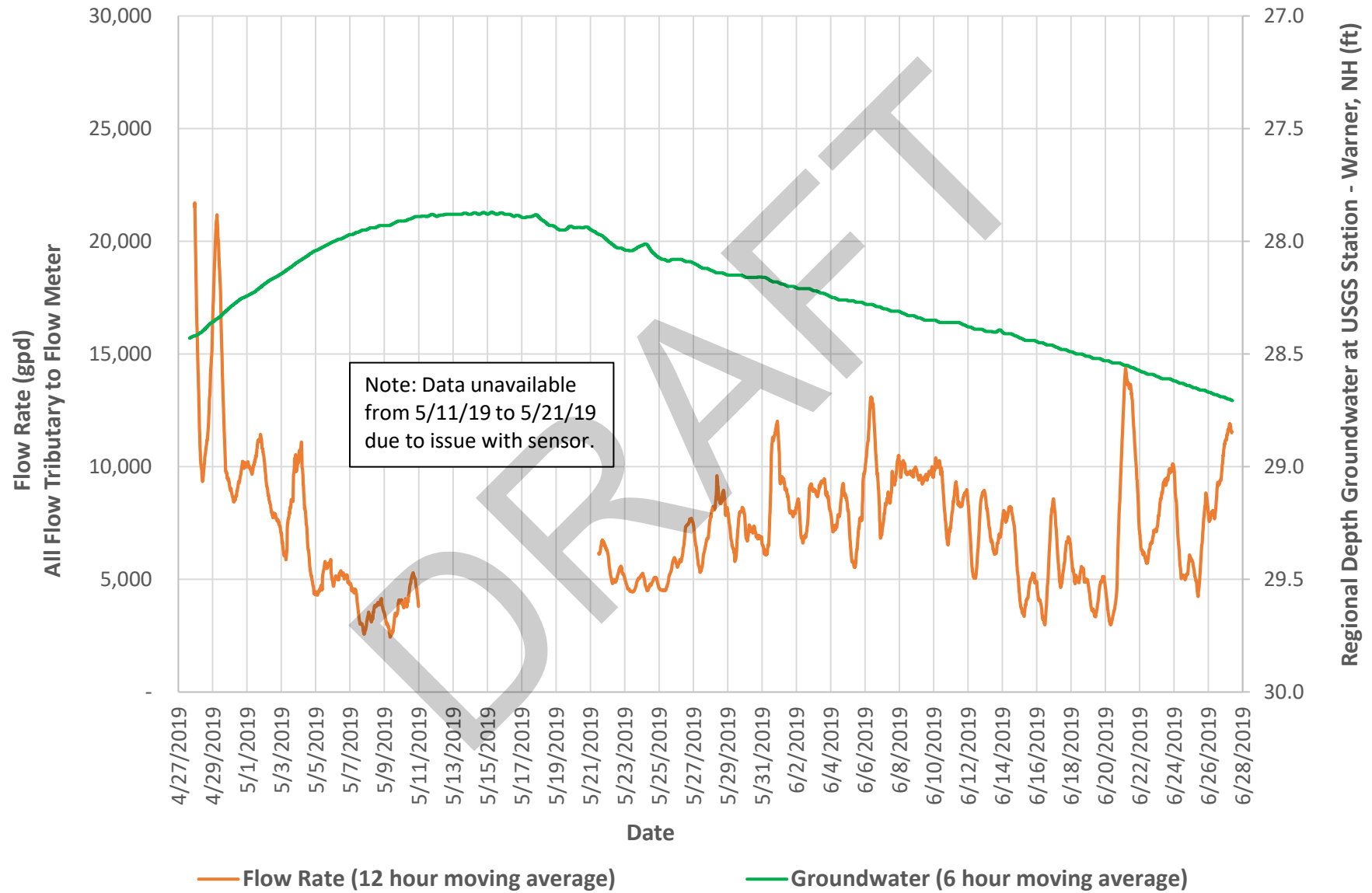


Figure 8D: Flow Meter #6 - Baltic Street (Enfield, NH)

Flow Rate vs Rainfall

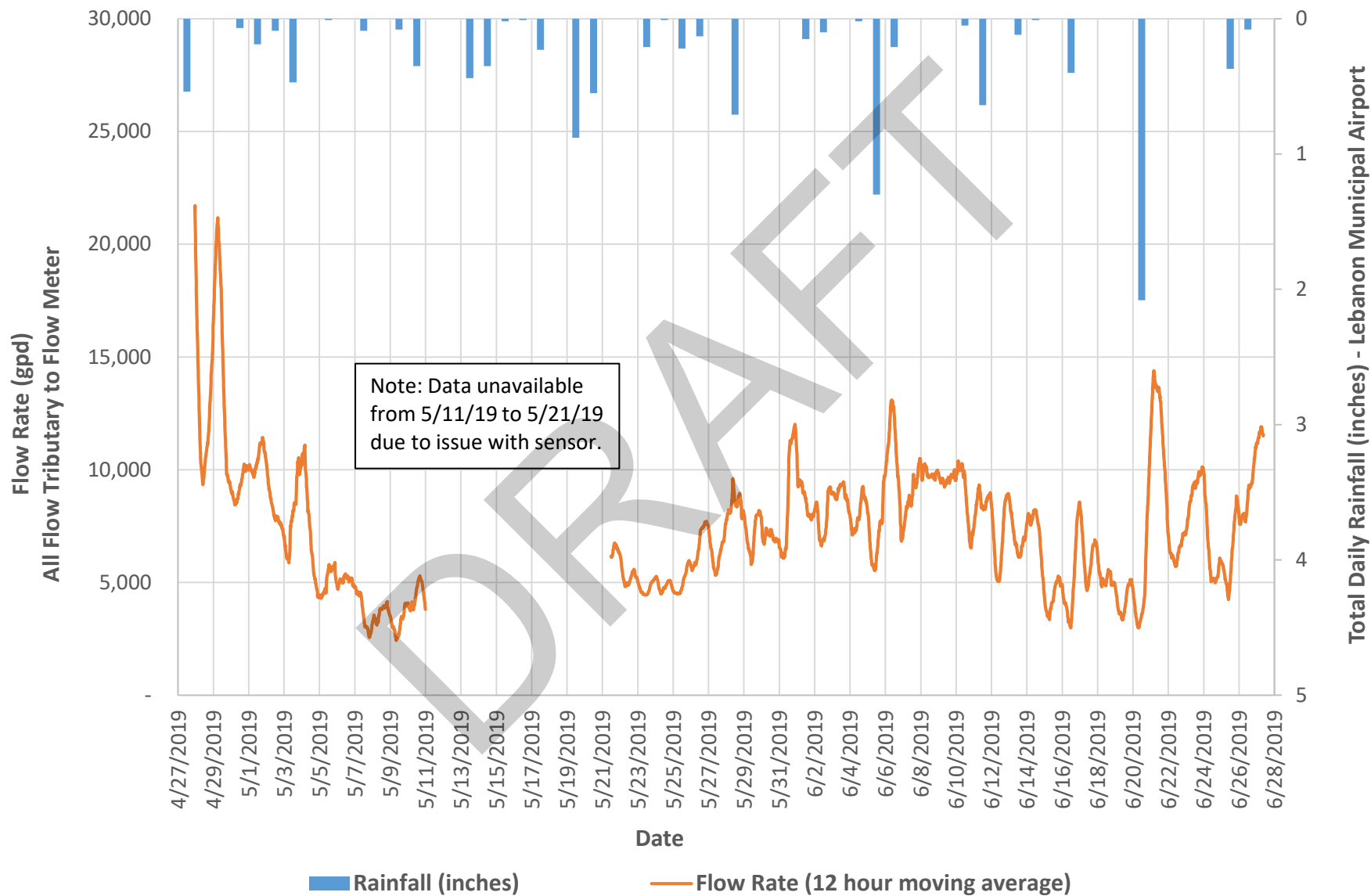


Figure 8E: Flow Meter #6 - Baltic Street (Enfield, NH)
Flow Rate vs Groundwater

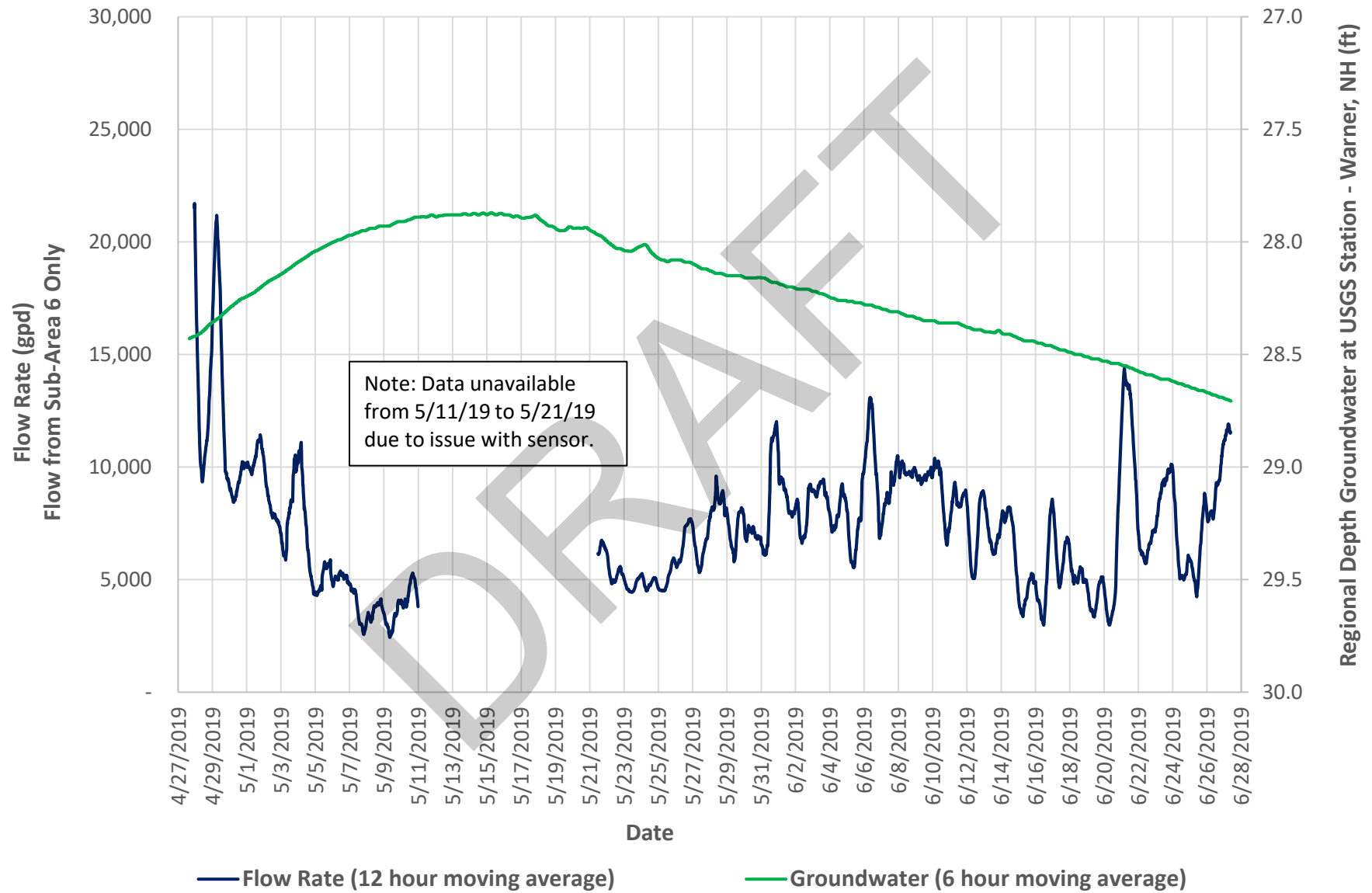


Figure 8F: Flow Meter #6 - Baltic Street (Enfield, NH)

Flow Rate vs Rainfall

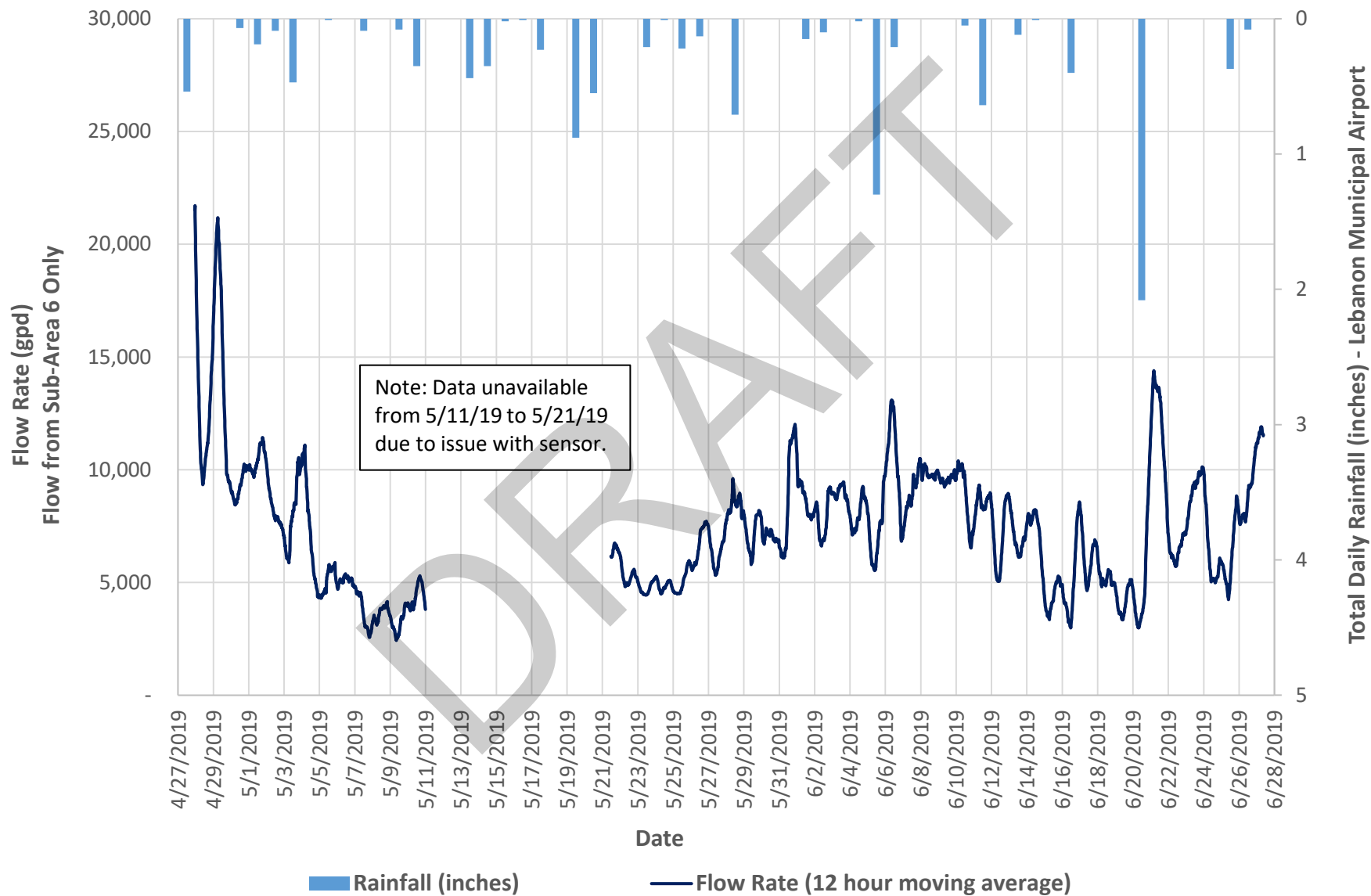


Figure 8G: Flow Meter #6 - Baltic Street (Enfield, NH)
Unit Flow Rate (gpd/idm) vs Groundwater

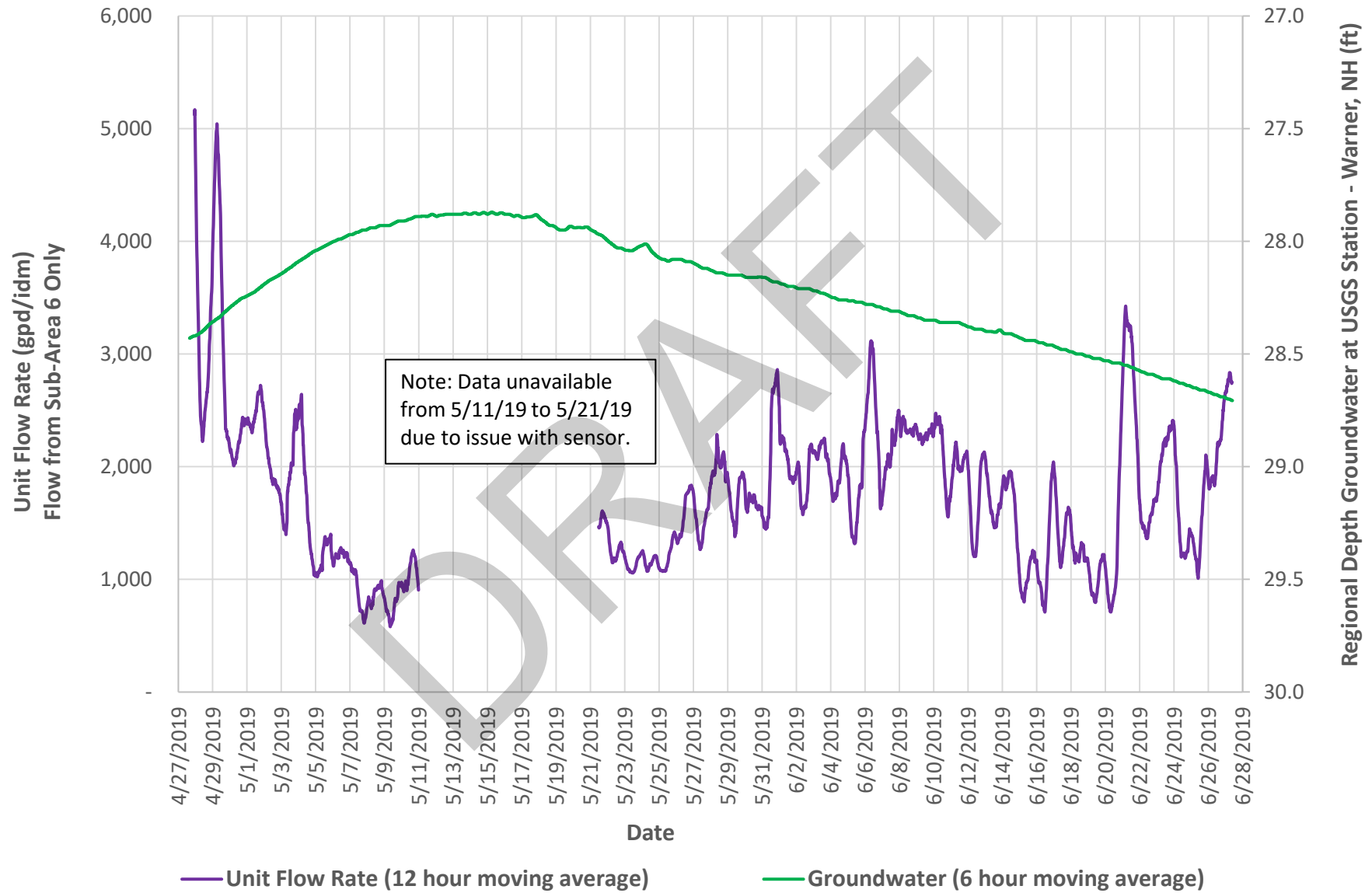


Figure 8H: Flow Meter #6 - Baltic Street (Enfield, NH)

Unit Flow Rate (gpd/idm) vs Rainfall

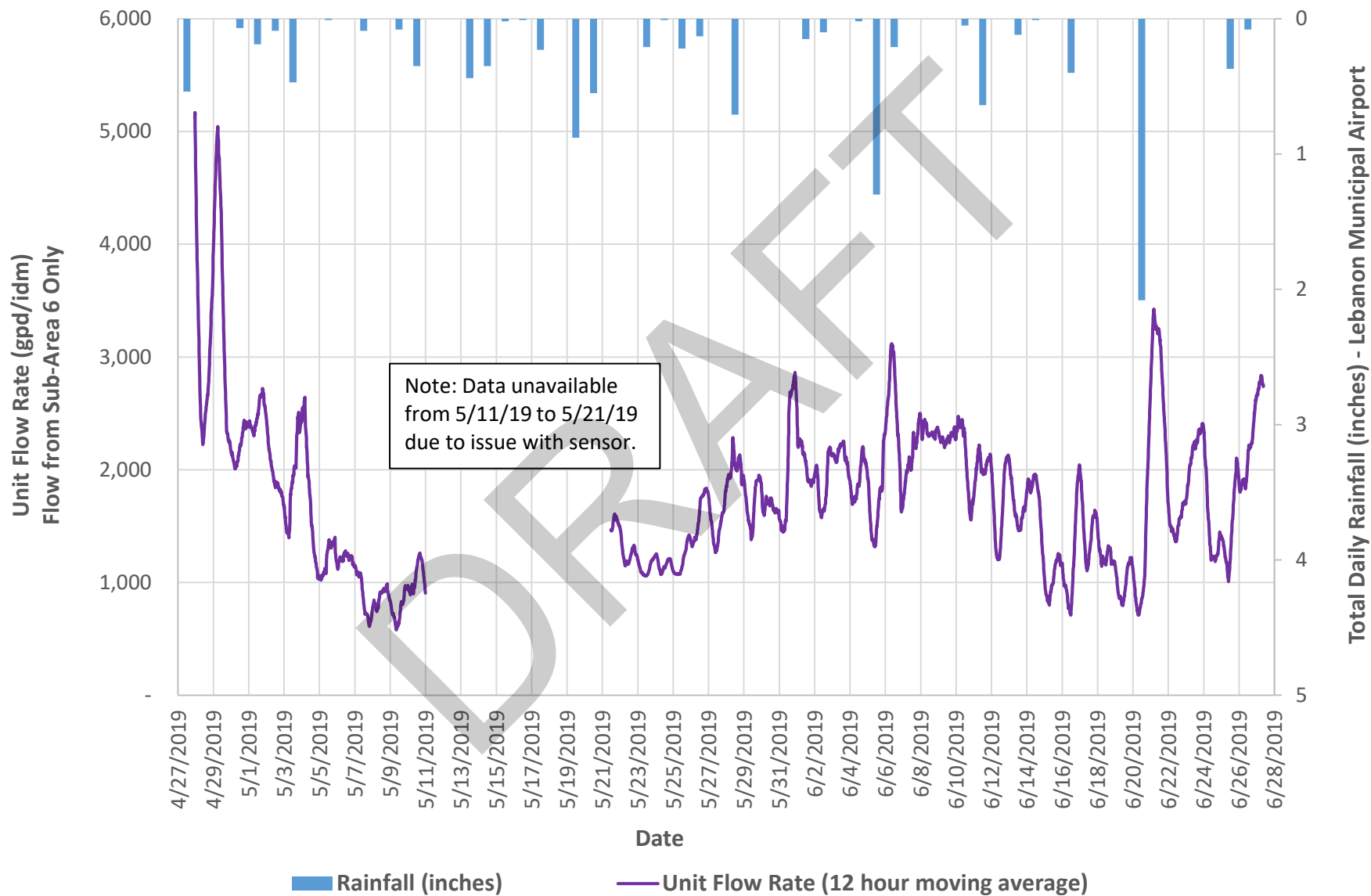


Figure 8I: Flow Meter #6 - Baltic Street (Enfield, NH)
Storm Event (5/19/2019)

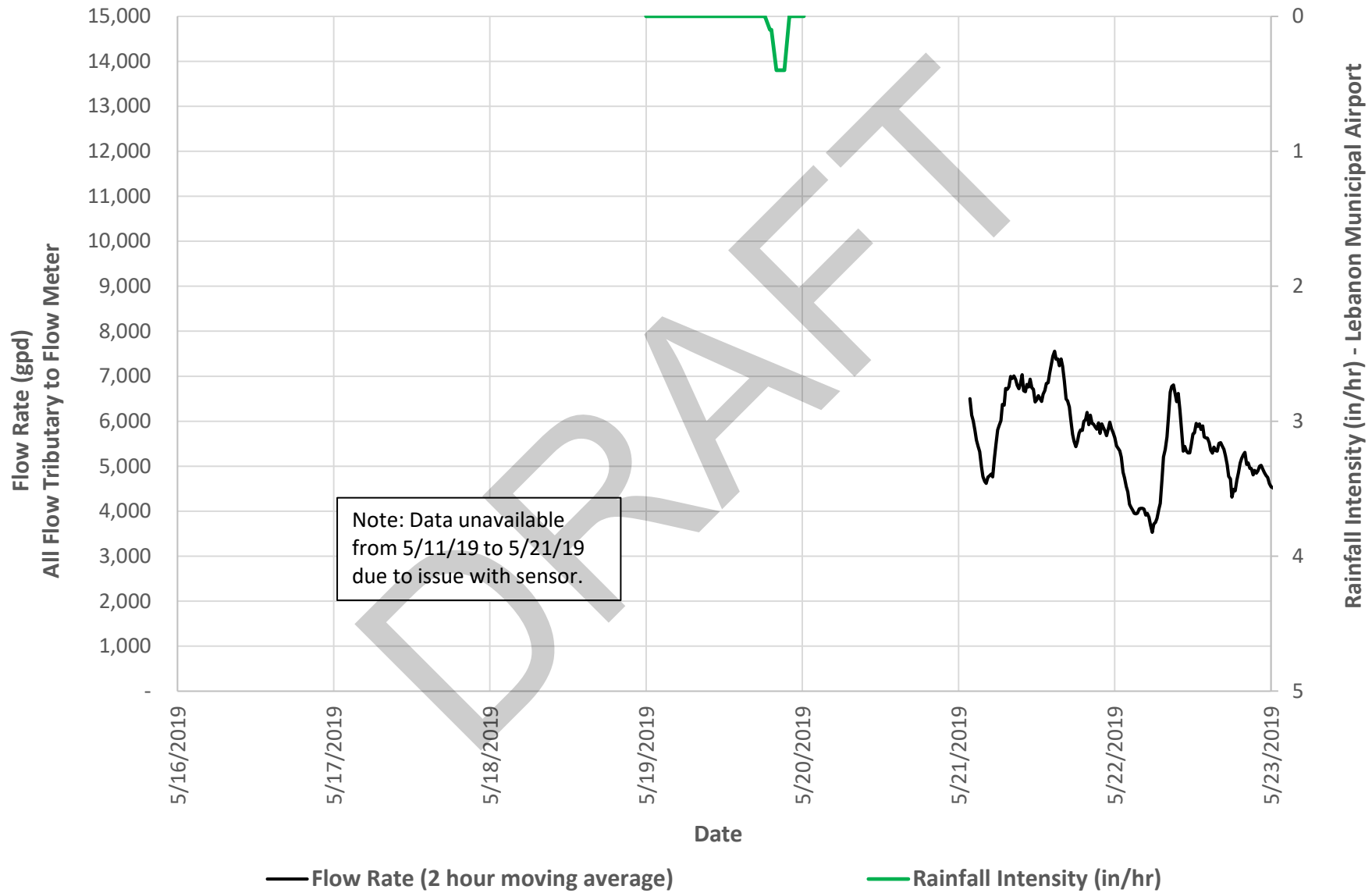


Figure 8J: Flow Meter #6 - Baltic Street (Enfield, NH)
Storm Event (6/5/2019)

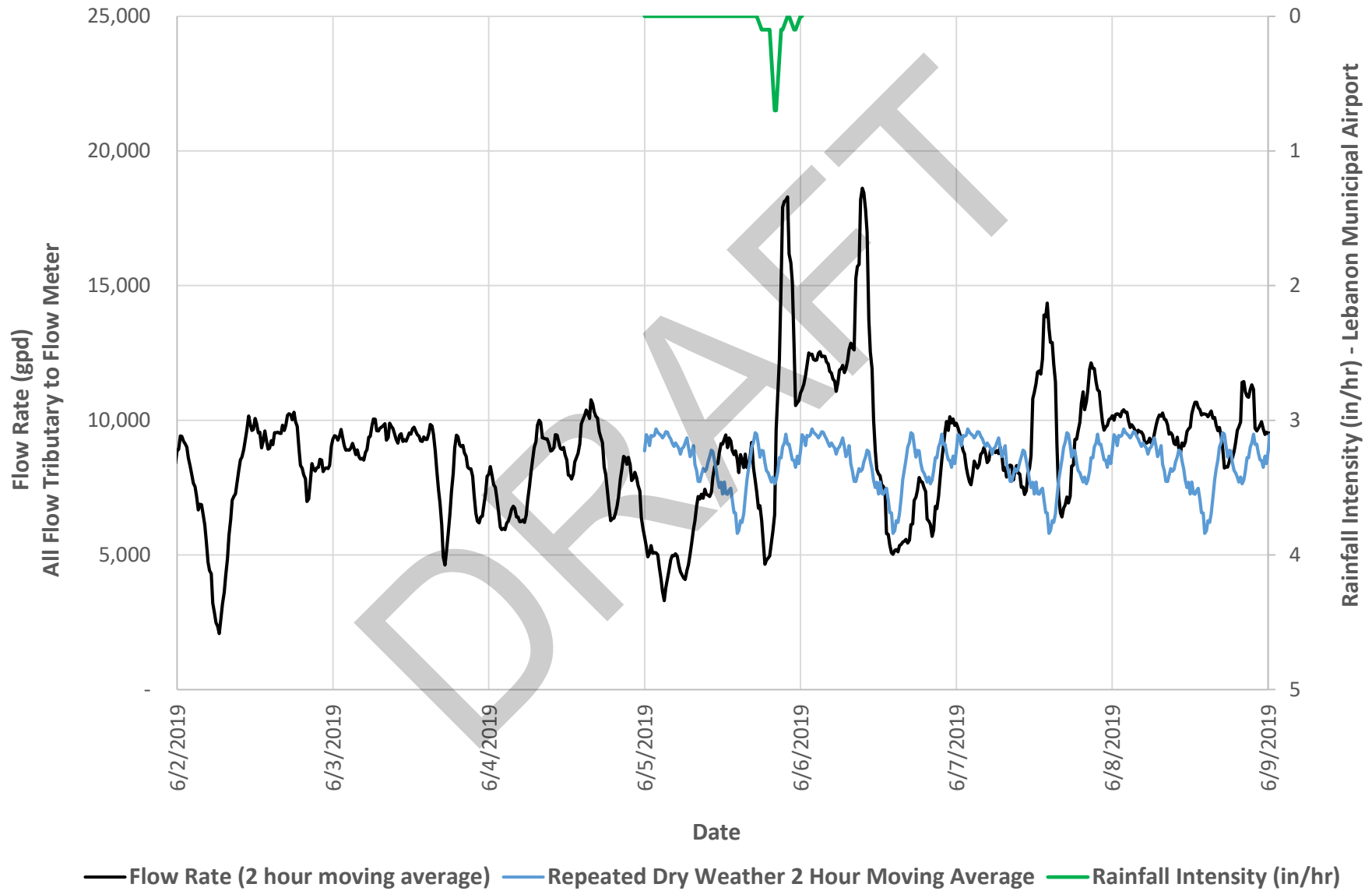


Figure 8K: Flow Meter #6 - Baltic Street (Enfield, NH)
Storm Event (6/20/2019)

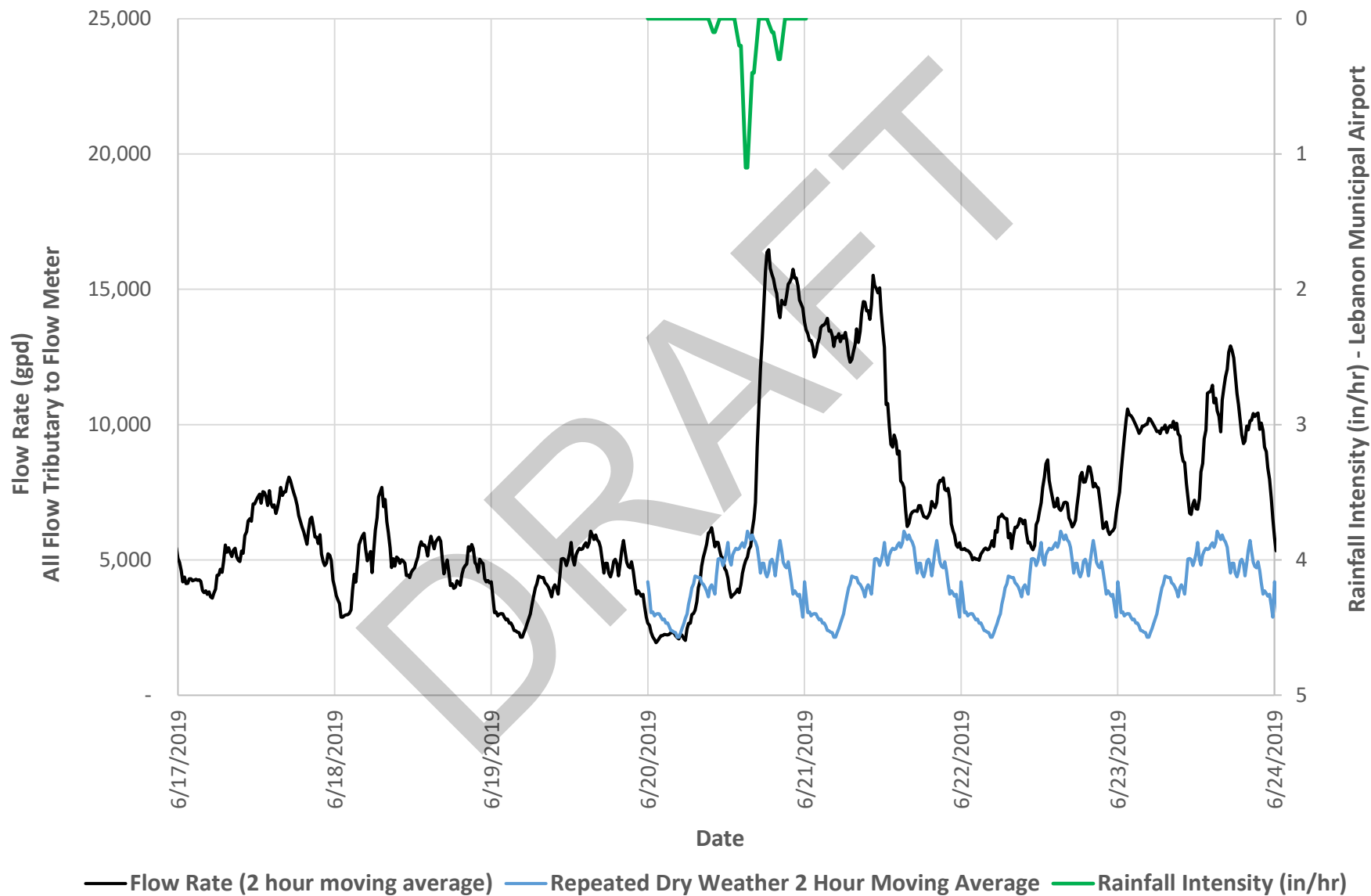


Table 1
Flow Monitoring Sub-Areas (Enfield, NH)



Meter Number (Sub-Area) ¹	Street Name/Location	Upstream Meter(s)	Total Length of Pipe in Sub-Area (lf)	Unit Length of Pipe (idm) in Sub-Area ²	Total Length of Pipe Tributary to Sub-Area (lf)	Unit Length of Pipe (idm) Tributary to Meter
1	Route 4A	N/A	6,520	11.0	6,520	11.0
2	Route 4	N/A	6,030	9.1	6,030	9.1
3	Main Street	2, 4, 5, 6	13,090	24.8	31,640	53.5
4	Union Street	N/A	7,350	11.7	7,350	11.7
5	Shaker Hill Road	N/A	2,420	3.7	2,420	3.7
6	Baltic Street	N/A	2,750	4.2	2,750	4.2
Non-Metered		N/A	4,390	8.5	4,390	8.5

Notes:

1. Refer to Figure 1

2. idm = inch-diameter-miles

Table 2**Total Daily Flows (Enfield, NH)**

Date	Average Daily Flow (gpd) ¹					
	Route 4A	Route 4	Main Street	Union Street	Shaker Hill Road ²	Baltic Street ³
4/27/2019	22,221	25,037	237,594	51,268	N/A	4,112
4/28/2019	21,457	20,912	174,753	29,437	N/A	2,625
4/29/2019	14,581	17,791	105,279	19,909	18,372	2,551
4/30/2019	14,264	14,468	83,666	14,169	16,694	1,929
5/1/2019	15,055	14,515	77,287	10,919	13,407	2,076
5/2/2019	16,218	17,130	79,601	14,307	12,253	1,488
5/3/2019	14,039	18,340	84,363	16,436	14,858	1,824
5/4/2019	16,948	17,811	93,880	18,232	17,611	1,159
5/5/2019	16,841	15,670	97,428	17,603	18,707	1,042
5/6/2019	14,073	14,098	74,285	14,758	14,220	1,009
5/7/2019	14,426	12,177	83,008	17,741	12,536	670
5/8/2019	14,308	12,084	99,361	15,114	12,277	735
5/9/2019	11,636	12,250	69,422	12,111	12,588	672
5/10/2019	12,339	13,957	87,827	17,327	12,572	852
5/11/2019	11,422	11,639	83,608	16,178	12,090	N/A
5/12/2019	12,288	12,968	84,234	13,570	9,308	N/A
5/13/2019	12,791	15,721	76,984	12,999	10,742	N/A
5/14/2019	11,658	18,500	91,684	14,561	7,150	N/A
5/15/2019	11,400	18,922	88,232	10,271	1,733	N/A
5/16/2019	8,983	22,438	77,539	9,460	3,371	N/A
5/17/2019	9,613	19,606	80,040	11,714	5,018	N/A
5/18/2019	8,990	14,517	75,144	9,597	6,602	N/A
5/19/2019	10,473	15,027	84,789	10,925	6,455	N/A
5/20/2019	9,974	17,853	141,765	22,637	6,723	N/A
5/21/2019	10,773	15,198	117,658	19,649	8,077	6,204
5/22/2019	7,499	13,443	91,972	16,705	6,448	5,002
5/23/2019	8,920	12,363	90,888	17,084	2,607	4,825
5/24/2019	9,015	13,344	95,172	13,997	766	4,714
5/25/2019	9,703	14,129	90,439	17,987	428	5,259
5/26/2019	9,319	16,268	119,031	19,164	606	7,152
5/27/2019	10,517	14,707	89,038	15,618	593	6,589
5/28/2019	11,297	18,808	104,932	15,134	451	8,361
5/29/2019	12,657	15,253	104,492	17,929	603	6,924

Table 2**Total Daily Flows (Enfield, NH)**

Date	Average Daily Flow (gpd) ¹					
	Route 4A	Route 4	Main Street	Union Street	Shaker Hill Road ²	Baltic Street ³
5/30/2019	12,187	14,186	94,971	11,693	872	6,949
5/31/2019	10,107	13,728	80,400	14,064	1,523	9,646
6/1/2019	10,718	12,580	88,974	12,680	724	8,442
6/2/2019	10,151	16,071	83,009	16,604	2,662	7,941
6/3/2019	10,293	13,772	73,462	13,922	1,441	8,667
6/4/2019	11,459	13,142	65,836	12,915	1,190	7,989
6/5/2019	12,303	16,249	80,054	11,574	841	7,914
6/6/2019	9,301	18,247	124,915	19,832	920	9,858
6/7/2019	9,382	14,301	118,144	13,042	3,381	9,435
6/8/2019	8,457	12,777	89,654	12,721	2,240	9,788
6/9/2019	10,821	13,304	72,779	16,454	1,930	9,565
6/10/2019	9,829	12,304	54,629	12,519	1,265	8,514
6/11/2019	10,302	13,985	59,626	16,421	1,754	8,425
6/12/2019	10,522	13,032	52,600	14,812	1,143	7,088
6/13/2019	8,076	12,847	46,938	14,880	2,595	6,913
6/14/2019	8,090	12,920	42,263	11,413	2,075	6,287
6/15/2019	8,901	11,681	44,397	9,728	2,782	4,547
6/16/2019	9,622	15,082	63,686	13,248	1,970	5,778
6/17/2019	9,899	8,605	38,011	15,222	1,559	5,657
6/18/2019	8,634	8,010	38,109	12,297	813	4,909
6/19/2019	10,809	11,568	32,030	11,435	372	4,166
6/20/2019	15,115	23,245	113,344	20,222	2,592	7,454
6/21/2019	13,284	19,907	158,243	21,830	1,590	10,318
6/22/2019	12,226	17,601	116,259	15,393	900	6,532
6/23/2019	11,042	17,403	121,889	9,066	783	9,656
6/24/2019	10,640	17,810	96,077	6,826	270	5,516
6/25/2019	13,414	18,230	103,256	8,899	663	6,473
6/26/2019	11,732	17,850	88,335	7,739	342	9,934
6/27/2019	11,057	10,164	64,602	6,889	132	11,342
Total Average Daily Flow =	11,680	15,280	89,390	45,140	5,120	5,840

1. Average Flows represent all Flows Tributary to Meter/Pump Station.

2. Meter misread data from 4/27/19 to 4/29/19 due to wastewater debris on sensor.

3. Data unavailable from 5/11/19 to 5/21/19 due to issue with sensor.

Table 3**Significant Precipitation Events (Enfield, NH)**

Storm Event	Total Rainfall (in) ¹	Peak Rainfall Intensity (in/hr) ^{1,2}	Regional Depth to Groundwater (ft below surface) ³
5/19/2019	0.88	0.4	27.9
6/5/2019	1.3	0.7	28.3
6/20/2019	2.08	1.1	28.5

1. Recorded at Lebanon Municipal Airport.

2. Represents peak rainfall intensity during the storm event.

3. Recorded at USGS Station in Warner, NH.

Table 4

Peak Infiltration Rates by Sub-Area (Enfield, NH)



Flow Meter ¹	Street Name/Location	Peak Infiltration Rate ² (gpd/idm)
1	Route 4A	340
2	Route 4	830
3	Main Street	1,160
4	Union Street	930
5	Shaker Hill Road	250
6	Baltic Street	2,160

Notes:

1. Refer to Figure 1
2. Nighttime flows for peak infiltration were averaged from midnight to 6 a.m. from 6/7/2019 through 6/9/2019

Table 5
Flow Composition by Sub-Area (Enfield, NH)



Meter Number (Sub-Area) ¹	Total Length of Pipe in Sub- Area (lf)	Unit Length of Pipe (idm) in Sub-Area	Total Average Daily Flow in Sub-Area	Estimated Base Sanitary Flow in Sub-Area	Estimated Flows from I/I in Sub-Area	Estimated Unit I/I in Sub-Area (gpd/idm)	Percent of Flows from I/I in Sub- Area	Percent of Total I/I from Each Sub-Area
1	6,520	11.0	11,680	5,000	6,680	610	57%	10%
2	6,030	9.1	15,280	8,000	7,280	800	48%	11%
3	13,090	24.8	49,110	15,000	34,110	1,380	69%	53%
4	7,350	11.7	15,140	5,000	10,140	870	67%	16%
5	2,420	3.7	5,120	2,000	3,120	840	61%	5%
6	2,750	4.2	5,840	3,000	2,840	680	49%	4%
Non-Metered	4,390	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

1. Refer to Figure 1
2. idm = inch-diameter-miles

Table 6
I/I by Sub-Area (Enfield, NH)



Meter/Pump Station Number (Sub-Area)	Street Name/Location	I/I		
		Infiltration	Inflow	Rainfall Induced Infiltration
1	Route 4A		X	
2	Route 4	X	X	X
3	Main Street	X	X	X
4	Union Street	X	X	X
5	Shaker Hill Road		X	X
6	Baltic Street	X		X

Notes:

1. Refer to Figure 1
2. idm = inch-diameter-miles

Table 7**Pipe Composition by Sub-Area (Enfield, NH)**

Sub-Area	Total Length of Pipe in Sub-Area (lf)	Unit Length of Pipe (idm) in Sub-Area	Pipe Type	
			Polyvinyl Chloride (PVC)	Ductile Iron (DI)
1	6,519	11.0	100%	0%
2	6,029	9.1	100%	0%
3	13,093	24.8	75%	25%
4	7,352	11.7	8%	92%
5	2,423	3.7	100%	0%
6	2,752	4.2	100%	0%
Non-Metered	4,393	8.5	36%	64%
Total =	42,560	73.0	84%	16%

Notes:

1. Refer to Figure 1
2. idm = inch-diameter-miles